

Wm Vaughan

A

T R E A T I S E
ON THE
P L A G U E
AND
Y E L L O W F E V E R.

With an APPENDIX, containing

HISTORIES OF THE PLAGUE AT ATHENS IN THE TIME OF
THE PELOPONNESIAN WAR; AT CONSTANTINOPLE
IN THE TIME OF JUSTINIAN; AT LONDON IN
1665; AT MARSEILLES IN 1720; &c.

By JAMES TYTLER, *k*

Compiler of the Medical Part of the Encyclopædia Britannica.

Let every one, Physician or not, freely declare his own sentiments about it;
let him assign any credible account of its rise, or the causes strong enough,
in his opinion, to introduce so terrible a scene.

THUCYDIDES.

'Twas all the business then
To tend the sick, and in their turns to die.
In heaps they fell.

ARMSTRONG.

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C O N T E N T S.

PART FIRST.

Of the Asiatic or True Plague.

SECTION I.

Page

Of the Plague in general.—Inquiry into the Antiquity of the Distemper.—Of the Plagues mentioned in the Old Testament.—History of several remarkable Plagues which, at various times, have desolated the world.

I

SECTION II.

Of the Countries where the Plague is supposed to originate.—The Influence of Climate in producing Diseases—And of the Moral Conduct of the Human Race in producing and influencing the same.

31

SECTION III.

Of Disease in general.—The nature of the Plague as a Disease considered.—Of Contagion.—Whether the Plague is really Contagious or not.—Medical History of the Distemper.—Inquiry into its Immediate Causes, and whether an approaching Plague is indicated by any visible Signs.

74

SECTION IV.

Of the best Methods of Preventing the Plague.

302

SECTION V.

Of the Cure of the Plague.

347

PART SECOND.

Of the Yellow Fever.

SECTION I.

History of the Yellow Fever.

371

SECTION II.

Symptoms of the Yellow Fever, as described by various authors.—Comparison between them and those of the Plague, with an inquiry into the Causes.—History of

the

CONTENTS.

	Page
<i>the Distemper as it has appeared in various parts of the United States since the year 1793.—A discussion of the question, Whether the Yellow Fever is Contagious or not.</i>	382
SECTION III.	
<i>Methods of Prevention and Cure.</i>	507
SECTION IV.	
<i>Remarkable Cases.</i>	534

APPENDIX.

N° I.	
<i>Account of the Plague at Athens, in the time of the Peloponnesian War :—From THUCYDIDES.—SMITH'S Translation.</i>	545
N° II.	
<i>Account of the Great Plague in the time of JUSTINIAN :—By PROCOPIUS.</i>	547
N° III.	
<i>Account of the Plague at London in 1665 :—From Dr. HODGES and others.</i>	548
N° IV.	
<i>Account of the Plague at Marseilles in 1720 :—From the Periodical Publications of the time.</i>	554
N° V.	
<i>Account of the Plague in Syria, Cyprus &c.—From Dr. PATRICK RUSSEL'S Treatise.</i>	ibid.
N° VI.	
<i>Remarkable case of a Remitting Fever at Bassorah in 1780.</i>	556
N° VII.	
<i>Set of Queries furnished by Doctors AIKIN and JEBB ; and by Mr. HOWARD put to several foreign Physicians, during his tour ; with their Opinions concerning the Plague.</i>	563

A
T R E A T I S E
ON THE
Plague and Yellow Fever.

PART FIRST.
Of the Asiatic or True Plague.

SECTION I.

Of the Plague in general.—Inquiry into the Antiquity of the Distemper.—Of the Plagues mentioned in the Old Testament.—History of several remarkable Plagues which, at various times, have desolated the world.

AMONG the many diseases which afflict the human race, we find ONE, upon record, so irresistible in its progress, so fatal in its attacks, and so entirely beyond the powers of medicine; that, like the serpent *Python*, the *Leviathan*, or the *Mammoth*, among animals, it has generally been distinguished by names expressive of its destroying nature; not, like other diseases, by any particular appellation derived from its symptoms. In the Hebrew language this distemper is expressed by the word which signifies *perdition*;^{*} in
Greek

^{*} Thus Dr. Hodges; but Calmet informs us, that the Hebrews call by the name of plagues all diseases sent by way of punishment or correction from God; as the pestilence, infection, the leprosy, sudden deaths, famines, tem-

Greek it is called *loimos*, from *luo*, to destroy ; in Latin, *pestis*, from *peffundo*, to overthrow ; and in English, the *plague*, from the Latin *plaga*, a stroke with a whip ; alluding to the common opinion, that it is a scourge from heaven, taking vengeance on mankind for their sins.

Other distempers, called by the general name of *Epidemics*, have at different times infested whole cities, and even overspread extensive regions ; but these, though sometimes very fatal, have always been found so much inferior to the distemper of which we treat, that, on a comparison, we may justly say, though epidemics have slain their *thousands*, the true plague has slain its *ten thousands*. In speaking of the destructive ravages of epidemics, we may count the dead by tens, by hundreds, or by thousands ; but in the true plague, always by thousands, by myriads,* or by millions. Procopius, when speaking of a plague which desolated the world in his time, compares the number of the dead to the sand of the sea ; and Mr. Gibbon, who attempts to specify, thinks they might amount to an hundred millions;† and I cannot help being of opinion, that the destruction generally occasioned by violent plagues, amounts to about one half of the population ;
the

pests : in a word, all calamities, whether public or private. *Calmel's Dict.* vol. ii. fol. 412. *Plaga*.

Parkhurst derives the Greek term *loimos*, either from *luo*, as above, or from another Greek word signifying *to faint* ; the same from which the English word *eclipse* has its origin ; or it may be from the Hebrew *lehem*, to consume.

A friend observes, that “ we no where find the word *perdition* in our version of the Old Testament. We have, however, the word *destruction*, which is of a similar import ; as, for instance, in Prov. xv. 11. where the Hebrew is *abdun*. In Rev. xvii. 8 & 11, we find the English word *perdition* ; but as we have no Hebrew version of the New Testament, we may advert to the ancient Syriac version. The Syriac being a sister dialect of the Hebrew, differs, radically, but little from it. The Syriac of the two places referred to above is *abdna* ; hence the word *abaddon*, whose root is *abd*, and is the same with that of the Hebrew word above.

“ As to the word *plague*, we often find it in the Old Testament, but perhaps never in that specific sense in which the moderns use it. The original word, rendered plague, is pretty generally *negp*, or its derivations ; as Exod. xii. 13. ii. Sam. xxiv. 21, &c.” On this last occasion, however, as the word *pestilence* had been used before, in the same chapter, we can scarce doubt its having been really some kind of disease : and we know that modern plagues will sometimes destroy as quickly as this is said to have done.

* A myriad is generally supposed to contain ten thousand.

† Gibbon's History, vol. iv.

the reasons for which opinion will be given in the course of this work. In all violent plagues, we hear of the dead being left unburied; of their being cast into pits, &c. But if we wish to make any gross comparison between the destructive power of the true plague, and that of any other violent epidemic, we cannot, perhaps, have a better instance than that which took place at Bafforah (a city on the confines of Persia) in the years 1773 and 1780.* In the former of these years that city was visited by the true plague; and in the latter, by an epidemic remittent fever. The fever was most violent in its kind, and destroyed twenty-five thousand in the city and neighbourhood; but the true plague, no fewer than two hundred and seventy-five thousand in the same place. Supposing the two computations therefore to be equally exact, we must calculate this plague to have been eleven times more deadly than the epidemic. If therefore the ingenious classifiers, in modern times, have brought into alliance the plague with other epidemic diseases, and characterised the former from the latter; we may justly say, that they have fallen into the same error with other naturalists, who characterise the superior from the inferior; the lion from the cat, not the cat from the lion. As to the remedies applied in these diseases, doubtful in epidemics, they so universally fail in the true plague, that, notwithstanding the improved state of medicine, we may yet say, it stands among diseases, in a great measure, like a giant without any champion to oppose; like a poison without any antidote.

In this unhappy predicament, the breaking out of a plague, in any city or country, proves a most distressing calamity, not only on account of the numbers destroyed by the disease itself, but by reason of the bonds of society being loosed; so that humanity gives way to terror; children are abandoned by their parents, and parents by their children; every thing wears the appearance of ruin and desolation; while, in too many instances, avarice urges on the unprincipled

* Transact. of Society for improving Medical Knowledge.

unprincipled to rapine, or even to murder. Nor are the cruel modes of prevention, sometimes practised even by the authority of the magistrate, less abhorrent to humanity, than the lawless outrages of the thief or murderer. Instances of all this will appear in the course of the work; the following are so remarkable, that I cannot help inserting them in this place. In the great plague at Marseilles, in 1720, the town being almost deserted, and few choosing to venture into it, "three sea-captains, and some hundreds
 " of sailors, having the courage to enter the city, from
 " the sea-side, found therein a gang of murderers, who
 " made it their business to destroy people seized with the
 " plague, and to plunder their houses. The ringleader
 " of them, named *Rouanne*, a gunsmith, was broken alive
 " upon the wheel, and forty others were hanged. Rou-
 " anne owned that he had killed a thousand persons.
 " There were found, upon one of the murderers, jewels
 " to the value of more than thirty thousand livres."*

During the time of this public calamity, four men, who came from Marseilles to Aix, were shot by order of the parliament, lest they should have brought the infection along with them.† Even this is not equal to what Mr. Howard informs us was practised in a hamlet of Dalmatia, where, the plague having raged with such violence, that only two or three remained; the neighbouring magistrates ordered these miserable survivors to be shot. At such prices will people buy a precarious, nay, an imaginary, safety. In short, what Mr. Gibbon says of the situation of people in the time of violent earthquakes, will also, in a great measure, hold good in the time of pestilence, or any great public calamity.
 " Instead of the mutual sympathy which might comfort
 " and assist the distressed, they dreadfully experience
 " the vices and passions which are released from a fear
 " of punishment; the houses are pillaged by intrepid
 " avarice, revenge embraces the moment, and selects
 " the victim: while ‡ vengeance frequently overtakes

* Political State for 1720.

† Political state, *ibid.*

“ the

‡ Mr. Gibbon, agreeably to the subject on which he writes, particularises the mode of vengeance; saying, “the earth frequently swallows up the assassin,” &c. It is hoped the substitution of the word *vengeance*, in general, will not be deemed a material alteration.

“ the affassin or ravisher in the consummation of his crimes.”

Whether the world hath been in the same predicament ever since the human race began to multiply, or whether plagues have originated at some remote period, is a question not easily determined. It is certain that, as far as histories go, they give us accounts of plagues; much less frequent indeed in very ancient times than in those which followed; but the compass of historical knowledge is narrow. There are no authentic histories of any nation previous to the termination of those of the Old Testament. Where sacred history ends, profane history begins. The fabulous period affords many accounts of wars, heroes, giants, and monsters, but scarce any of plagues. Diodorus Siculus indeed makes mention of a plague which happened in Greece, after the flood of Deucalion; and which, he says, was occasioned by the general corruption of vegetables, &c. consequent on the flood. Deucalion's flood is supposed to have been nearly cotemporary with the departure of the Israelites from Egypt; so that, if there is any truth in the relation of Diodorus, it is not improbable that some of the Egyptian plagues might have spread into Greece. We are likewise told of a pestilence at Athens in the time of Theseus;* but all the accounts of these times are so uncertain, and so much involved in fable, that little or no dependence can be placed on any of them.

The first distinct account we have of plagues of any kind, then, is in the book of Exodus, where we are told of many heavy judgments sent upon the Egyptians because of their disobedience. Before this, indeed, we read of plagues sent on the king of Egypt, for having taken Abraham's wife; but as these fell only upon the king and his household, we cannot suppose any thing like a general pestilence to have taken place among the people. In like manner did it happen to Abimelech, king of Gerar, on the same account. All the women belonging to the king's household were rendered barren
for

* Univ. Hist. vol. vi.

for a time; but we hear of nothing happening to the nation at large. Again, when Moses and Aaron went in before Pharaoh, they said to him, "Let us go and sacrifice to the Lord our God; lest he fall upon us with the sword, or with *pestilence*." This shews indeed that both Moses and Pharaoh knew that such a thing as *pestilence* existed, or might exist; but it cannot prove that the disease we now call the plague or pestilence commonly took place among nations in those days as it has done since. Even among the plagues inflicted upon the Egyptians by the hand of Moses and Aaron, we find only two that can be supposed to have any similarity to the disease we now call the *plague*; viz. the *boil*, and the destruction of their first born. The former *may* have been pestilential buboes; the latter also *may* have been the effect of a most malignant pestilence; such as, in the beginning of it, is said frequently to kill suddenly, as by lightning; but whether it was so or not, we cannot now determine.

In the history of Job, who is supposed to have been cotemporary with Moses, we have a case more in point. The boils, with which he was covered, are by Dr. Mead supposed to have been the small pox; though in the true plague the body is sometimes covered with gangrenous pustules, constituting a disease still more dangerous and painful than the small pox; but whatever the disease of Job was, we may reasonably conclude, that in his time there was none similar to it commonly existing among mankind.

After the departure of the Israelites from Egypt, we find frequent mention of a plague as a disease commonly to be met with; but it was always that of leprosy; those destructive plagues, which might be supposed to resemble the disease we now call by that name, being all miraculous. Concerning the prevalence of the leprosy among the Jews, Diodorus says that they "were driven
" out of Egypt as impious, and hateful to the gods; for
" their bodies being overspread and infected with the
" itch and leprosy, (by way of expiation) they got them
" together, and, as profane and wicked wretches, expelled
" them

“them out of their coasts.” This he tells us was a reason given to one of the kings of Syria why he should exterminate the Jews. In another place our author gives the following account of the origin of the Jewish nation. “In ancient times there happened a great plague in Egypt, and many ascribed the cause of it to God, who was offended with them. For there being multitudes of strangers of several nations who inhabited there, who used foreign ceremonies, the ancient manner of worship was quite lost and forgotten. Hence the natural inhabitants concluded, that unless the strangers were driven out, they should never be freed from their miseries. Upon which they were all expelled,” &c. He then tells us that some of them came into Greece under the conduct of Danaus and Cadmus; but the greater part entered Judea, then quite desert and uninhabited. Their leader “was one *Moses*, a very wise and valiant man,” &c.*

The allusion, in this last passage of Diodorus, to the plagues of Egypt, mentioned in Exodus, is manifest; and it is equally manifest, that the Egyptians themselves, as well as the sacred historian, owned them to be miraculous. Here, however, let it be remarked, that, though these, and others inflicted on the Israelites, were miraculous, we are not from thence to conclude that they took place without the intervention of natural causes. On the contrary, in speaking of the plagues of Egypt, we are told, that when the locusts came, “the Lord sent a strong *east wind*, all that day and all that night; and when it was morning, the *east wind* brought the locusts.” In like manner “the Lord turned a mighty strong *west wind*, which took away the locusts, and cast them into the Red sea.” Again, when the sea itself was divided, “the Lord caused it to go back by a strong *east wind* all that night.” The Egyptians were witnesses to this; but, as they did not believe that the powers of nature had any superior, they could never be induced to think that any of the elements would take part in a dispute between two nations, or favour the one more than the other. In

* Diodor. Sic. Frag.

In diseases inflicted on the human body, we are assured that the powers of nature were as much employed as in the miracles already mentioned. When it was told David that the child born to him by Bathsheba should die, the infant was seized with a natural distemper, probably a fever, and died the seventh day. When Hezekiah was informed that he should die, he did not, any more than David had done, give himself up to despair; but used, for his recovery, such means as were in his power, viz. prayers to God; from whom, by the constitution of things under the Old Testament, he would receive a direct answer. And it is remarkable, that though the answer was favourable, yet the disease was not removed by any invisible power operating like a charm, but by the use of a remedy. It is plain therefore that this disease was occasioned by one natural power, and removed by another. The boil (for that was the distemper) was brought to maturity by a poultice of figs, and the king recovered.* If then the scripture informs us, that even where the Deity himself speaks, he has directed the use of a remedy, much more ought we to be diligent in the use of such as our feeble skill can suggest, in those cases where he leaves us entirely to the exercise of our own judgments. To sit down supinely, in case of a dangerous distemper, with a notion, that if God wills us to die we certainly shall die, *in any use of natural means*; and if he wills the contrary, that we shall as certainly recover, *in any neglect of them*; is a conduct equally unscriptural and absurd.

In the books of Moses we find the Israelites, in case of disobedience, threatened with the *botch* of Egypt; with terror, consumption, and the *burning ague*. From the name of this last we may reasonably suppose it to have been the same with the remitting fever of the East, which is attended with the most intolerable sensation of burning in the bowels; but whatever the nature of these diseases might have been, they certainly were not very common in the world at that time, or they would not have been threatened as extraordinary judgments.

* Mead.

judgments. They were not the same with the pestilence; because we find, that after they had been threatened with fever, consumption, and extreme burning, it is added, "I will make the *pestilence* cleave unto thee:" as if it had been said, that the pestilence, which hitherto had appeared only on extraordinary occasions, should then become *endemic*, and never leave them. But, on the whole, the first account we have of any general plague, seems to be that which was inflicted on the Jews on account of the sin of their king in numbering the people. David was nearly cotemporary with the Trojan war; and Homer, in the first book of his *Iliad*, informs us, that a plague likewise took place in the camp of the Greeks; and that too for the sin of their king in carrying off the daughter of the priest of Apollo, and refusing to restore her at the entreaty of her father.

In comparing the account of the sacred historian with that given by Homer, we cannot help observing a striking similarity between them. Both plagues were inflicted on the people for the sin of their kings; both were miraculous; the one continued three days, the other nine. In both the Deity himself appeared: an angel brandished a drawn sword over Jerusalem; and Homer says, that, from the top of Olympus, Apollo shot his arrows into the Grecian camp. Lastly, both were stopped in a similar manner: David offered sacrifices to the true God; and Agamemnon returned Chryseis, his captive, to her father, the priest of Apollo, by whose prayers and sacrifices the plague was stopped. Hence it seems not impossible, that the story told by Homer, is only that of David, altered as he thought most proper for embellishing his poem; and that this was the first remarkable plague in the world.

In the year 767 B. C. we hear of a universal pestilence; but the imperfect state of history in those early periods affords few accounts that can be depended upon, either concerning that or any thing else.* Till after the foundation of Rome, indeed, authentic history scarce

* In the subsequent section this plague will be more fully treated of.

scarce commences ; and it is not till the 279th year of that city, that we hear of its being in any remarkable degree infected with a pestilential disorder.* The plague we speak of is said to have taken place about the year 469 B. C. which comes within 38 years of that of Athens in the time of the Peloponnesian war. The near coincidence of these dates, in times so remote, and when chronology was so little settled, tends to excite a suspicion that both arose from the same infection. Of its ravages at Athens we have an excellent account by the historian Thucydides,† who was an eye witness of what he writes. He says, that according to report it began in Ethiopia, from whence it came down into Egypt, and thence into other countries. It is possible, therefore, that it might reach Italy some time before it came into Greece ; for it seems scarce probable, that such a very violent infection could have taken place in Italy without being communicated to the neighbouring countries ; whence we may reasonably conclude, that the first plague at Rome, and that of Thucydides, were the same. At Rome, we are informed, it swept away almost all the flower of the youth who were able to bear arms, the greatest part of the tribunes, and both the consuls. The mortality was so great, that no place of sepulture could be found for the dead bodies, but they were thrown promiscuously into the Tiber. In short, so low were the Romans at this time reduced, that the Æqui and Volsci, two Italian nations with whom they were almost always at war, made an immediate attack, in hopes of being easily able to carry the city ; but in this they were disappointed. The situation of Athens was truly deplorable ; being not only engaged in a foreign war, but crowded with people from the country ; numbers dying daily in the streets, and the survivors giving themselves up to all manner of licentiousness.‡

As

* A plague is spoken of in the time of Romulus ; but the accounts of this, and some others, are extremely obscure and indistinct.

† See Appendix No. I.

‡ See Thucydides's account at large, Appendix No. I.

As it seems probable that the same infection desolated both Rome and Athens, so it seems not unlikely that it was a continuance of the same which destroyed the Carthaginian army in Sicily, while carrying on a successful war against Dionysius, tyrant of Syracuse. The plague, as we are informed by the Universal History, was common in the Carthaginian territories, especially those on the continent of Africa; and this pestilence broke out soon after the conclusion of the Peloponnesian war. As it originally came from Africa, it is probable that it had never been quite extinguished there; and the compilers of the Universal History think it probable that the army might have brought the seeds of it along with them into Sicily. But, whatever was the origin, the distemper soon became so malignant, that the living were not sufficient to bury the dead; and those who attended the sick perished in such a manner, that, after some time, few dared to come near them. At first they gave the dead a kind of burial; but in time the number became so great, and the survivors so few and weak, that an hundred and fifty thousand are said to have rotted above ground. "Justin seems to intimate that almost the whole Carthaginian army perished by the plague; and that in a manner all at once, as it were in an instant. Diodorus, however, informs us, that a considerable body of Africans and Iberians survived the dreadful calamity. It is worth observation, that not a single person of those who attended the sick survived." The miserable remains of this army, consisting at first of more than three hundred thousand, were now attacked by their enemies, whom they were no longer able to resist. Their land forces were entirely defeated, and their fleet was burnt: "the Gods themselves, (says Diodorus) when the ships were all in a blaze, and the flames ascending above the masts, seeming to destroy the Carthaginians with lightning from heaven." Forty gallies still remained, and the unfortunate general was now obliged to purchase liberty to return with the few men he had left. But even these were treacherously
attacked

attacked by the tyrant's fleet, and several of them sunk. On his arrival at Carthage, he found the whole city not only in mourning, but in despair: "the wretched inhabitants giving full vent to their grief, made the shore ring with their groans and lamentations. In short, a greater scene of horror, except the spot of ground where the Carthaginian army encamped before Syracuse, than Carthage now was, cannot well be conceived." This reception completed the despair of the unhappy general. Clothing himself in mean and fordid attire, he joined with the rest in bewailing their common calamities. After some desperate exclamations against the gods, whom he accused of partiality, "The enemy, said he, may rejoice at our misery, but have no reason to glory in it. The troops we have lost did not fall by their valour, nor did they now oblige those that arrived here to leave Sicily by force. We return victorious over the Syracusians, and are only defeated by the plague. As for the baggage found in our camp, this ought not to be looked upon as the spoils of a conquered enemy, but as moveables which the casual death of their owners has left the Syracusians in possession of." Having then gone on to express his grief for the loss of his army, and declared his intention not to outlive them, he shut himself up in his house, refusing admittance even to his own children, and put an end to his life.*

Whether the unfortunate remains of this army brought with them the infection to Carthage, and there produced a new scene of desolation, we are not informed; but there seems to have been a very great tendency to pestilential disorders in the Carthaginian armies; for, in the time of the siege of Syracuse by Marcellus, a plague broke out in the camp of the Carthaginians who had come to assist the Syracusians. From them it passed into the city itself, with so much malignity, that nothing was to be seen but heaps of dead and dying. None durst receive or assist the sick, for fear of being infected by them; and the bodies of the dead were, for the

* Univ. Hist. vol. xvii.

the same reason, left unburied, to infect and poison the air with their putridity and corruption. Nothing was heard, night and day, but groans of dying men; and the heaps of dead bodies continually presented mournful objects to the living, who expected every moment the same fate.* The infection reached the Roman camp; but we do not hear of its being conveyed, at this time, either to Rome or Carthage. In the time of the contest with Jugurtha, however, a very terrible calamity took place in Africa. "According to Orosius, "a great part of Africa was covered with locusts, which "destroyed all the produce of the earth, and even devoured dry wood. But, at last, they were all carried by the "wind into the sea, out of which being thrown in vast "heaps upon the shore, a plague ensued, which swept "away an infinite number of animals of all kinds. In "Numidia only, perished eight hundred thousand men; "and in Africa Propria, two hundred thousand; among "the rest, thirty thousand Roman soldiers, quartered in "and about Utica for the defence of the last mentioned "province. At Utica, in particular, the plague raged "with such violence, that fifteen hundred dead bodies "were carried out of one gate in a day."†

From the time that the Romans finished their African wars, till they had accomplished most of their conquests in Asia, their empire seems to have continued free from this dreadful scourge; but soon after the destruction of Jerusalem by Titus, such a violent infection seized on the city, that for some time upwards of twenty thousand are said to have died in it daily.

As the Roman arms were carried still farther to the eastward, and all the countries reduced, to the confines of Persia, the plague seems to have become more common among them. In the time of Marcus Aurelius, a war was undertaken against the Parthians, which was carried on by the Romans with great success, and with no less cruelty; for, though the city of Seleucia opened its gates to the Roman general, he caused the inhabitants, to the number of four hundred thousand, to be massacred,

* Univ. Hist. vol. viii.

† Id. vol. xviii.

massacred. But they soon paid dear for this cruelty, by a dreadful pestilence, which broke out, according to the historian Ammianus Marcellinus, in the very city which they had desolated, and was brought by their army into Italy, from whence it spread throughout the whole empire. Other historians say, that it originated in Ethiopia, from whence it spread into Egypt, and thence into the country of the Parthians. We know not how long the infection continued; only that, some years afterwards, when the emperor was defeated by the Germans, the pestilence still raged to such a degree, that slaves, gladiators, and even the banditti of Dalmatia and Dardania, were enlisted for the defence of the empire. It is certain that great havock must have been made by it, as we find that the barbarians were encouraged to invade the empire on all sides, and could scarcely be repulsed; insomuch that historians compare this with the most destructive wars the Romans had ever waged.*

During the time that the empire was overrun by the northern barbarians, the plague frequently made its appearance; which we shall have occasion to notice more particularly in the following section; but in those times the destruction by the sword was so extraordinary, that less mention is made by history of any pestilential disorder. In the time of Justinian, however, about sixty-five years after the final destruction of the western empire, the most violent plague recorded in history took place. Of this we have a particular account by Procopius.† “The distemper (says Mr. Gibbon) arose in the neighbourhood of Pelusium, on the confines of Egypt, between the Sarbonian bog and the eastern channel of the Nile. From thence, tracing, as it were, a double path, it spread to the east, over Syria, Persia, and the Indies, and penetrated to the west, along the coast of Africa, and over the continent of Europe. In the spring of the second year, Constantinople, during three or four months, was visited by this pestilence. Such was the corruption of the air, that the pestilence

* Univ. Hist. vol. xv.

† See Appendix, No. II.

“ silence was not checked, nor alleviated, by any difference of seasons. The numbers that perished in this extraordinary mortality have not been recorded; only we find that, during three months, there died at Constantinople five, and at last ten thousand a day. Many cities of the east were left vacant, and, in several districts of Italy, the harvest and vintage withered on the ground. The triple scourge of war, pestilence and famine afflicted the subjects of Justinian; and his reign is disgraced by a visible decrease of the human species, which has never been repaired, in some of the fairest countries of the globe.”*

This plague broke out in the time of Justinian, in the year 541 or 542 of the christian era; and not only ravaged Constantinople in the time of Justinian, but returned with increased violence during the reigns of many of his successors. In the time of Mauritius we find the Avari, a barbarous nation to the north of the Danube, driven back by the plague after they had crossed that river to invade the Roman territories. The reign of Phocas, successor to Mauritius, was still more unfortunate. “ Great numbers were swept off, either by famine or pestilence; the earth refused her fruits in season; the winters were so severe, that the seas were frozen, and the fish destroyed.” Phocas ascended the imperial throne in 603; but in the midst of such confusion as then filled the world, we can scarce expect an accurate account of the time when this most malignant pestilence ceased. We can scarcely suppose it to have lasted two centuries; but, in the reign of Constantine Copronymus, which began in 742, we find the distemper still raging, and the same dreadful phenomena of nature still continuing. The plague, we are now told, broke out in Calabria in Italy; whence it soon spread

* Gibbon's Hist. vol. iv. Procopius, in speaking of the numbers who died in this extraordinary plague, compares them to the sand of the sea; and afterwards expresses them by a phrase which has been translated *two hundred millions*. The phrase is *myriadas myriadon myrias*. Mr. Gibbon, by dropping the first word, restricts the sense to *one hundred millions*; which he thinks not wholly inadmissible; but the probability seems to be, that Procopius did not mean to specify the number, but to represent it as incalculable. This is done by putting a comma, or semicolon, after the first word; and we may then read, that there perished *myriads; a myriad of myriads*. The grammar is rectified by reading *myriades* instead of *myriadas*.

spread over Greece, Sicily, the islands in the *Ægean* sea, and at last reached Constantinople; where it raged for three years together, with such fury, that the living were scarce sufficient to bury the dead. The earthquakes, which accompanied or preceded this pestilence, were such as had never been known in any age. In Syria and Palestine several cities were swallowed up; others, entirely ruined; and some, if we may give credit to Nicephorus, removed without any considerable damage, six miles and upwards from their former seats. At the same time happened an extraordinary darkness, which lasted from the fourth of August to the first of October, there being little or no distinction, during all that time, between day and night.* During the reign of the same prince, there happened such an extraordinary frost, that, at Constantinople, both seas were frozen for an hundred miles from the shore; the ice being covered with snow twenty cubits deep, and sufficiently strong to bear the heaviest carriages. When the frost broke, mountains of ice and frozen snow, being driven by the wind through the straits, did a great deal of damage to the walls of Constantinople. The month following, several prodigies appeared, or were thought to appear, in the air. At the same time a comet, which the Greeks called *Docites*, because it resembled a beam, was seen for ten days in the east, from whence it moved into the west, and shone there for one and twenty days more. The people were struck with terror and amazement at the sight of the prodigies, and apprehended the last day to be at hand.† Dreadful earthquakes, strange phenomena in the heavens, inundations, &c. occurred in the year 812, during the reign of Michael Balbus; but no remarkable plague is mentioned by the Greek historians, till the year 1025, when a new train of calamities took place. The plague broke out in Cappadocia, raging with such violence there, as well as in Paphlagonia and Armenia, that the people were forced to abandon their dwellings. A terrible famine followed; after which the earthquakes again commenced with redoubled

* Univ. Hist. vol. xvii.

† Ibid.

bled fury : at Constantinople they continued forty days together ; while people were terrified by a *comet* (probably a large meteor) which passed with a dreadful noise from north to south ; the whole horizon appearing to be in a flame.

From these calamities the world, at least that part of it known to the Greek historians, appears to have enjoyed some respite till the year 1346. Indeed we may now say, as in the time of the invasion by the northern barbarians, that the sword, and not the pestilence, was the plague of those times. A most violent and universal pestilence, however, now took place ; though, for want of such historians as Thucydides and Procopius, we cannot here give a particular account of it. In general we are told, that it began in the kingdom of Cathay (the northern part of China) from whence it gradually overspread all the countries between that and the western extremity of Asia. Invading, at last, Constantinople, it proceeded from thence to Greece, Italy, France, Africa, Germany, Hungary, Denmark, Britain and Ireland. Thus, it seems to have been as extensive a contagion as ever appeared in the world. It is even probable, that, from the remains of this contagion, Europe hath been but very lately set at liberty ; as we hear, not long after, of plagues being very frequent in different parts of that continent. In England it assumed somewhat of a new form towards the end of the fifteenth century ; being then known by the name of the English Sweating Sicknefs. But, except in the greater propensity to sweat, the disease appears not to have differed from the true plague. The sweating sicknefs first made its appearance in the army of Henry VII, when he landed at Milford in 1483 ; and that year invaded London, where it continued only from the 21st of September to the end of October. It returned in 1485, 1506, 1517, 1528 and 1551 ; since which time it has not been known in Britain. In 1517 it was extremely violent and mortal ; sometimes killing the sick in three hours ; and so general was the infection, that, in some places, one half of the inhabitants

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died.

died. In 1528 it also raged with great violence; the sick sometimes dying in four hours. The last attack, in 1551, was also very violent. In 1529 it appeared in Holland and Germany, destroying great numbers of people; but it hath not been observed, at least in any remarkable degree, in those countries since that time. In the course of the 17th century, various parts of Europe have suffered very much from the plague in its usual form. Indeed (for reasons given in the subsequent section) we can scarce suppose the pestilential contagion ever to have ceased entirely. In 1603, London was visited with the plague; and on this occasion the practice of shutting up infected houses was first introduced.* In 1656 another plague took place in the same metropolis, but does not appear to have made any violent attack. In Naples it raged that year with great fury; destroying, according to some accounts, fifteen thousand, according to others, twenty thousand, a day. But these accounts the author of the Journal just quoted, with great probability, supposes to have been exaggerated. Others say, that four hundred thousand Neapolitans were destroyed by this infection; so that we must at any rate believe it to have been very violent. In the plague of London in 1665, immense numbers perished; and particular accounts were published of this calamity; of which an abridgment is given in the Appendix to this work, No III. Since that time it has not been known in Britain; but other parts of Europe have not been equally fortunate. In the beginning of the eighteenth century it appeared in several parts of the continent; particularly in Copenhagen in the year 1711; where it committed great ravages, as it had done at Dantzic two years before; but in 1720 it appeared at Marseilles in France, where it raged with such fury as to destroy sixty out of the hundred thousand supposed to be the whole population of the place.† Since that time France hath been free from the distemper; but in Sicily, the dominions of the Ottoman Porte, and places adjacent, it hath been

felt

* Journal of the Plague Year.

† See Appendix, No. IV.

felt very severely. In 1743 it was supposed to have destroyed two thirds of the inhabitants of Messina. A particular account of its ravages was read before the Royal Society of London by Dr. Mead. The following is taken from Dr. Lobb's Treatise on the Plague. "From the beginning of June to the end of July, of
" forty thousand inhabitants, two thirds perished. The
" disorders in the city were incredible. All the bakers
" died, and no bread was baked for many days. The
" streets were full of dead bodies ; at one time from
" twelve to fifteen thousand remaining in the open
" air : men, women and children, rich and poor, all together dragged to the church doors. The vaults being
" full, and the living not sufficient to carry the dead
" out of the city, they were obliged to put them on
" funeral piles, and burn them promiscuously. No-
" thing was more shocking than to see people, far above
" the common stations, go about begging for a loaf of
" bread, when they could hardly walk, with their
" tumours upon them ; and few were in a state to help
" them. All these calamities did not hinder the most
" execrable villanies, which were committed every moment ; and, though so few survived, the governor
" was obliged to make several public examples."

In the Turkish dominions, though we have not read of such extraordinary devastations as formerly took place, yet we are assured that the pestilence rages there very frequently. From 1756 to 1762 we have histories of it by Dr. Ruffel and others, the substance of which accounts is given in the Appendix, No. V. In the time of the great war between the Turks and Russians, it found its way to Moscow, which city it invaded in 1771. M. Savary says, it was brought thither by infected merchandise from the store-houses of the Jews ; and that it carried off two hundred thousand people. In the sixth volume of the Medical Commentaries, however, we are told that it was brought from the army by two soldiers ; both of whom were carried into the military hospital, and both died. The anatomist who dissected their bodies died also. The infection quickly seized the
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the hospital, and thence the whole city. This happening in the beginning of the year, its progress was for some time checked by the cold; but its ravages became greater as the summer advanced. It raged most violently during the months of July, August and September; in which time there were instances of its destroying twelve hundred persons in a day. Twenty-five thousand died in the month of September; in the course of which month scarce one in an hundred of the infected recovered.* Only seventy thousand, according to this account, perished by the disease. The year 1773 proved very fatal to Bassorah; where, as formerly mentioned, two hundred and seventy-five thousand perished in the summer season, through the violence of the distemper.* But in countries where the plague rages so frequently, and where there are few that make observations with any accuracy, we cannot expect complete histories of every attack made by it; neither would the limits of this Treatise admit of a detail of them, though there were. We know, however, that since the year we speak of, the plague has ravaged Dalmatia, particularly in the year 1784, when it almost desolated the town of Spalatro, destroying three or four thousand of its inhabitants. Though some countries therefore have for a number of years remained free from the attacks of this terrible enemy, yet there are others where it is as it were stored up, and from whence it may, on a proper occasion, break forth as formerly, and once more spread ruin and desolation through the world.

SECTION

* An English gentleman, who resided in Bassorah at that time, preserved himself from the infection by retiring to a mud-house, where he had no communication with the inhabitants. Having a large quantity of Bengal cotton, he sold it to the people to wrap their dead in. The price was put in a basket, which he hauled up by a rope to his ware-room; lowering it again with the proportionate quantity of cloth. In the course of the summer he had an account of *seventy thousand* winding sheets thus disposed of!

(Transact. of a Society for improving Medical Knowledge.)

SECTION II.

*Of the Countries where the Plague is supposed to originate.
—The Influence of Climate in producing Diseases—And
of the Moral Conduct of the Human Race in producing
and influencing the same.*

IN considering the origin of a calamity so dreadful and so universal, we might reasonably suppose that the fatal spots which gave rise to it would long ago have been marked out and abandoned by the human race altogether. But this is far from being the case. In the accounts already given of various plagues, they are always said to have been imported from country to country, but never to have originated in that of the person who wrote of them. If a plague arose in Greece, we are told it came from Egypt; if in Egypt, it came from Ethiopia; and had we any Ethiopic historians, they would no doubt have told us that it came from the land of the Hottentots, from Terra Australis Incognita, or some other country as far distant as possible from their own. In short, though it has been a most generally received opinion, that plagues are the immediate effects of the displeasure of the Deity on account of the sins of men; yet, except David and Homer (already quoted) we find not one who has had the candour to acknowledge that a plague originated among his countrymen on account of their sins in particular. In former times Egypt and Ethiopia were marked out as the two great sources of the plague; and even as late as the writings of Dr. Mead we find that the same opinion prevailed. The Doctor, who attempts to explain the causes of the plague, derives it entirely from the filth of the city of Cairo, particularly of the canal that runs through it. But later writers, who have visited and resided in Egypt, assure us that the country is extremely healthy, and that the plague is always brought there from Constantinople. It is true that Dr. Timone, in the Philosophical Transactions, No. 364, tells us, that it appears from daily observation, as well as from history, that the plague comes

comes to Constantinople from Egypt; but the united testimonies of Savary, Volney, Mariti and Ruffel, who all agree that Egypt receives the infection from Constantinople, must undoubtedly preponderate.

“ The pestilence (says M. Savary) is not a native of Egypt. I have collected information from the Egyptians, and foreign physicians who have lived there twenty or thirty years; which all tended to prove the contrary. They have assured me that this epidemic disease was brought thither by the Turks, though it has committed great ravages. I myself saw the caravels of the Grand Signior, in 1778, unlade, according to custom, the silks of Syria at Damietta. The plague is almost always on board; and they landed, without opposition, their merchandise, and their people who had the plague. It was the month of August; and, as the disease was then over in Egypt, it did not communicate that season. The vessels set sail, and went to poison other places. The summer following, the ships of Constantinople, alike infected, came to the port of Alexandria, where they landed their diseased without injury to the inhabitants. It is an observation of ages, that if, during the months of June, July and August, infected merchandise be brought into Egypt, the plague expires of itself, and the people have no fears; and if brought at other seasons, and communicated, it then ceases. A proof that it is not a native of Egypt is, that, except in times of great famine, it never breaks out in Grand Cairo, nor the inland towns, but always begins at the seaports on the arrival of Turkish vessels, and travels to the capital; whence it proceeds as far as Syria. Having come to a period in Cairo, and being again introduced by the people of Upper Egypt, it renews with greater fury, and sometimes sweeps off two or three hundred thousand souls; but always stops in the month of June, or those who catch it then are easily cured. Smyrna and Constantinople are now the residence of this most dreadful affliction.”

M. Volney

M. Volney informs us, that the European merchants residing at Alexandria agree in declaring that the disease never proceeds from the internal parts of the country, but always makes its first appearance on the sea-coasts at Alexandria; from thence it passes to Rosetta, from Rosetta to Cairo, and from Cairo to Damietta, and through the rest of the Delta. It is invariably preceded by the arrival of some vessel from Smyrna or Constantinople; and it is observed, that if the plague has been violent during the summer, the danger is greater for the Alexandrians during the following winter.

To the same purpose, the Abbe Mariti says, "The plague does not usually reside in Syria, nor is this the place where it usually begins. It receives this fatal present from Egypt, where its usual seat is Alexandria, Cairo or Damietta. The plague of 1760 came at once from Cairo and Alexandria; to the latter of which it had been brought from Constantinople. When it comes from that capital, as well as from the cities of Smyrna and Salonica, it acquires a peculiar malignity; and its activity never expands itself with more fury than in the plains of Egypt, which it overspreads with incredible rapidity. It is observed, that this plague, so destructive to Egypt, seldom attacks Syria; but that the latter has every thing to dread from a plague hatched in the bosom of Egypt."

The testimony of these three authors, who have all been lately on the spot, must certainly have very great weight, especially when corroborated by that of Dr. Ruffel; for which see Appendix, No. V. But still there is some difficulty. M. Savary informs us, that, *except in cases of great famine*, the disease never breaks out in Cairo; which certainly implies that in cases of famine it does originate in the city itself; and Mariti, by saying that the Syrians have much reason to dread a plague *hatched in the bosom* of Egypt, undoubtedly intimates that plagues sometimes do originate in Egypt. Smyrna and Salonica likewise seem to come in for their share of the blame; and Dr. M'Bride, in his Practice of Physic, informs

informs us, that some parts of Turkey are visited by the plague once in six or seven years; and M. Savary says, that Egypt is visited with it once in four or five years; but if Egypt never receives it but from Turkey, it would seem that the plague could at least be no more frequent than in that country; or, if the fact be otherwise, that the disease must either originate in Egypt itself, or be brought to it from some other country than Turkey. Dr. Timone, in the paper already quoted,* tells us, that the plague has taken up its residence in Constantinople; but that, though the seeds of the old plague are scarce ever wanting, yet a new infection is likewise imported from time to time. Thus, in attempting to find out the countries where the plague originates, we are led in a circle. Constantinople accuses Egypt, and Egypt recriminates on Constantinople. Ethiopia, the most distant and least known of those countries which in former times had any connexion with the more civilized parts of the world, for a long time bore the blame of all; but the Jesuit missionaries who resided long in Abyssinia (the ancient Ethiopia) do not mention the plague as more common in that country than some others; neither does Mr. Bruce, in the accounts he has published, take notice of any such thing. Ethiopia could not speak for itself, by reason of the ignorance and barbarity of its inhabitants; and Constantinople is now very much in the same predicament. The investigation of this subject therefore would require an accurate account of the climates of those countries where the plague is found to commit the greatest ravages, and a comparison of them with those which are now accounted the most unhealthy in other respects, and likewise a comparison of the diseases produced in the latter, with the true plague.

The most unhealthy climates now existing (those where the plague commonly rages excepted) are to be met with in the hottest parts of the world; the East and West Indies, the wastes of Africa, and some parts of America. In all these, Dr. Lind, who has written a
treatise

* Philosoph. Transact. No. 364.

treatise on the diseases incident to Europeans in hot climates, seems to lay the whole blame upon the heat and moisture accompanying it. In the East Indies Bencoolen, in the island of Sumatra, is the most unhealthy of all the English settlements; but he informs us, that by building their fort on a dry, elevated place, about three miles from the town, it became sufficiently healthy. Next to this, Bengal is most subject to sickness; for which he assigns the following reason: "The rainy season commences at Bengal in June, and continues till October; the remainder of the year is healthy and pleasant. During the rains, this rich and fertile country is covered by the Ganges, and converted as it were into a large pool of water. In the month of October, when the stagnated water begins to be exhaled by the heat of the sun, the air is then greatly polluted by the vapours from the slime and mud left by the Ganges, and by the corruption of dead fish and other animals. Diseases then rage, attacking chiefly such as are lately arrived. The distempers are fevers, of the remitting or intermitting kind; for, though sometimes they may continue several days without sensible remission, yet they have in general a great tendency to it. If the season be very sickly, some are seized with a malignant fever, of which they soon die. The body is covered with blotches of a livid colour, and the corpse, in a few hours, turns quite livid and corrupted. At this time fluxes prevail, which may be called bilious or putrid, the better to distinguish them from others which are accompanied with inflammation of the bowels. The island of Bombay has of late been rendered much more healthy than it formerly was, by a wall built to prevent the encroachments of the sea, where it formed a salt marsh; and by an order that none of the natives should manure their cocoa-trees with putrid fish.

"Batavia, the capital of the Dutch East India dominions, is annually subject to a fatal and consuming sickness. Here the Dutch, in attempting to make this, their capital in India, resemble their cities in Europe, have adorned it with canals or ditches, intersecting each
E. other,

“ other, running through every part of it. Notwithstand-
 “ ing the utmost care to keep these clean, during the
 “ rainy season, and after it, they become extremely nox-
 “ ious to the inhabitants, but especially to strangers. It
 “ has been remarked, that the sickness rages with the
 “ greatest violence when the rains have abated, and the
 “ sun has evaporated the water in the ditches, so that the
 “ mud begins to appear. This happened in 1764, when
 “ some British ships of war had occasion to stay for a little
 “ time at Batavia. The stench from the mud was into-
 “ lerable; the fever was of the remitting kind; some were
 “ suddenly seized with a delirium, and died in the first
 “ fit; but none survived the attack of a third. Nor was
 “ the sickness at that time confined to the ships; the
 “ whole city afforded a scene of disease and death; streets
 “ covered with funerals, bells tolling from morning to
 “ night, and horses jaded with dragging the dead in her-
 “ ses to their graves. At that time a slight cut of the skin,
 “ the least scratch of a nail, or the most inconsiderable
 “ wound, turned quickly into a putrid, spreading ulcer,
 “ which, in twenty-four hours, consumed the flesh, even
 “ to the bone. Besides these malignant and remitting fe-
 “ vers, which rage during the wet season in the unhealthy
 “ parts of the East Indies, Europeans, especially such as
 “ live intemperately, are also subject to fluxes, and to an
 “ inflammation, or disease of the liver; which last is almost
 “ peculiar to India, and particularly to the Coromandel
 “ coast.”

In the same work we have an extract from Mr. Ives's
 journal of a journey from India to Europe by land.
 “ Gambroon in Persia, says he, is very unhealthful.
 “ Few Europeans escape being seized with putrid inter-
 “ mitting fevers, which rage from May to September,
 “ and are often followed with obstructions of the liver.
 “ Various authors who have treated of Gambroon, do,
 “ as well as the present English factory, impute its un-
 “ healthfulness, during the summer months, to the nox-
 “ ious effluvia with which the air is contaminated, from
 “ the great quantities of blubber fish left by the sea up-
 “ on the shore, and which very soon become highly of-
 “ fensive.

“ fenfive. In the rainy feafons, at the ifland of Karee,
“ in the Persian Gulf, intermitting fevers and fluxes are
“ the ufual diftempers. On our arrival at Bagdad (fup-
“ pofed to contain 500,000 fouls) we found a purple
“ fever raging in the city; but though it was computed
“ that an eighth part of the inhabitants were ill, yet the
“ diftemper was far from being mortal. Here we were
“ informed that the Arabs had broken down the banks
“ of the river near Bafforah, with a design to cover with
“ water the deferts in its neighbourhood. This, it feems,
“ is the ufual method of revenge taken by the Arabs for
“ any injury done them by the Turks at Bafforah; and
“ was represented to us as an act of the moft shocking
“ barbarity, fince a general confuming ficknefs would
“ undoubtedly be the confequence. This was the cafe
“ fifteen years before, when the Arabs, by demolifhing
“ the banks of this river, laid the environs of Bafforah
“ under water. The ftagnating and putrefying water in
“ the adjacent country, and the great quantity of dead
“ and corrupted fifh at that time lying upon the fhore,
“ polluted the whole atmofphere, and produced a putrid
“ and moft mortal fever, of which between twelve and
“ fourteen thoufand of the inhabitants perifhed; and, at
“ the fame time, not above two or three of the Europeans
“ who were fettled there efaped. The effects of the
“ violent heats we endured were, an entire lofs of appe-
“ tite, a faintnefs and gripes, with frequent and bilious
“ ftools; which greatly exhausted our ftrength. My
“ ftomach was often fo weak, that it could receive only
“ a little milk. Several of us became feverifh through
“ the exceffive heat, and were obliged to have recourfe
“ to gentle vomits, &c. Though we were furnifhed
“ with the moft ample conveniencies for travelling,
“ which money, or the ftrongeft recommendations to
“ the principal chriftians, as well as mahometan chiefs,
“ could procure, and had laid in a quantity of excellent
“ madeira, claret, and other provifions, &c. yet moft
“ of us fuffered in our constitutions by this long and fa-
“ tiguig journey.”

On

On these climates in general Dr. Lind observes, that in well cultivated countries, such as China, the air is temperate and wholesome; while the woody and uncultivated parts prove fatal to multitudes accustomed to breathe a purer air. In all places also, near the muddy and impure banks of rivers, or the foul shores of the sea, mortal diseases are produced from the exhalations, especially during the rainy season. “There is a place
“near Indrapour, in Sumatra, where no European can
“venture to remain, or sleep one night on shore, during
“the rainy season, without running the hazard of his
“life, or at least of a dangerous fit of sickness; and at
“Podang, a Dutch settlement on Sumatra, the air has
“been found so bad, that it is commonly called the
“Plague-Coast. Here a thick, pestilential vapour or fog
“arises, after the rains, from the marshes, which de-
“stroy all the white inhabitants.”

In treating of the diseases of Africa, the same author takes notice of those of Egypt; which country, he says, is rendered unwholesome by the annual inundation of the Nile, and being surrounded on three sides by large and extensive deserts of sand, by which means it is exposed to the effects of that noisome vapour, which, during the summer months, arises from sultry, hot sand. He doth not, however, say, that the true plague originates in this country, either from the inundation of the Nile or any other cause. On the climate of Egypt I shall once more quote M. Savary, who is a strenuous advocate for its healthiness, and is at pains to confute the opinion of Mr. Pauw, and others, who assert the contrary. “Mr. Pauw (says he) pretends, that at pre-
“sent Egypt is become, by the negligence of the Turks
“and Arabs, the cradle of the pestilence; that another
“epidemical disease, equally dreadful, appears here, by
“the caravans of Nubia; that the culture of rice en-
“genders numerous maladies; that the want of rain
“and thunder occasions the air of the Thebais to acquire
“a virulence that ferments the humours of the human
“body, &c.” “These assertions (M. Savary observes)
“have an air of probability, which might impose on
“people

“ people who have not lived in Egypt ; but Mr. Pauw
“ has ventured opinions in his closet, without the guid-
“ ance of experience. In vallies, indeed, enclosed by
“ high mountains, where the atmosphere is not conti-
“ nually renewed by a current of air, the culture of rice
“ is unwholesome, but not so, near Damietta and Ro-
“ setta. The plains are nearly on a level with the sea ;
“ neither hill nor height impedes the refreshing breath of
“ the north, which drives the clouds and exhalations off
“ the flooded fields southwards, continually purifies the
“ atmosphere, and preserves the health of the people ;
“ so that the husbandmen who cultivate the rice are not
“ more subject to diseases than those who do not. The
“ heats of the Thebais certainly surpass those of many
“ countries under the equator. Reamur’s thermometer,
“ when the burning breath of the south is felt, some-
“ times rises to thirty-eight degrees above the freezing
“ point,* often to thirty-six. Were heat the principle
“ of diseases, the *Said* (Upper Egypt) would not be habi-
“ table ; but it only seems to occasion a burning fever,
“ to which the inhabitants are subject ; and which they
“ cure by regimen, drinking much water, and bathing
“ in the river : in other respects they are strong and
“ healthy. Old men are numerous, and many ride on
“ horseback at eighty. The food they eat in the hot
“ season contributes much to the preservation of their
“ health ; it is chiefly vegetables, pulse and milk. In
“ Lower Egypt, the neighbourhood of the sea, the large
“ lakes, and the abundance of the waters, moderate the
“ sun’s heat, and preserve a delightful temperature.
“ Strabo and Diodorus Siculus, who long lived here,
“ did not think the country unhealthy. There is, in-
“ deed, an unwholesome season in Egypt. From Febru-
“ ary till the end of May, the south winds blow at in-
“ tervals, and load the atmosphere with a subtle dust,
“ which makes breathing difficult, and drive before
“ them pernicious exhalations. Sometimes the heat
“ becomes insupportable, and the thermometer sudden-
“ ly rises twelve degrees. The inhabitants call this sea-
“ son

* Water boils at eighty degrees of this thermometer.

“son *Khamfin*, *fifty*; because these winds are most felt
“between Easter and Whitsuntide; during which sea-
“son they eat rice, vegetables, fresh fish and fruit;
“bathing frequently, and using plenty of perfumes and
“lemon juice; with which regimen they prevent the
“dangerous effects of the *Khamfin*. But it must not
“be supposed that this wind, which corrupts meat in a
“few hours, blows fifty days. Egypt would become a
“desert. It seldom blows three days together; and
“sometimes is only an impetuous whirlwind, which ra-
“pidly passes, and injures only the traveller overtaken in
“the deserts. When at Alexandria a tempest of this
“kind suddenly arose, driving before it torrents of burn-
“ing sand, the serenity of the sky disappeared, a thick
“veil obscured the heavens, and the sun became blood-
“coloured. The dust penetrated even the chambers, and
“burnt the face and eyes. In four hours the tempest
“ceased, and the clearness of the day appeared. Some
“wretches in the deserts were suffocated, and several
“I saw brought to appearance dead; some of whom,
“by bathing in cold water, were restored to life.”

The internal parts of the continent of Africa are but little known. The northern parts, containing the States of Barbary, are sufficiently healthy; the middle parts of the western coast, known by the names of Negroland, Guinea, &c. are extremely unhealthy and pernicious to strangers. Dr. Lind informs us, that, at a distance, this country appears in most places flat, covered with low, suspended clouds; and on a nearer approach heavy dews fall in the night time; the land being every morning and evening wrapped up in a fog. The ground is clothed with a pleasant and perpetual verdure, but altogether uncultivated, excepting a few spots, which are generally surrounded with forests or thickets of trees, impenetrable to refreshing breezes, and fit only for the resort of wild beasts. The banks of the rivers and rivulets are overgrown with bushes and weeds, continually covered with slime, which sends forth an intolerable stench. All places however are not equally unhealthy; nor is any place equally unwholesome

wholesome at all times of the year. It is only with the rainy season that the sickness commences. But as it would be tedious, and not answer our present purpose, to enumerate those places which are healthy, and those which are not, I shall only extract from Dr. Lind's work an account of one which seems to be as bad as can well be imagined. It is called *Catchou*, a town belonging to the Portuguese, and situated in 12 degrees N. lat. "I believe (says the author of this account) "there is scarce to be found on the whole face of the "earth a more unhealthy country than this during the "rainy season. We were thirty miles distant from the "sea, in a country altogether uncultivated, overflowed "with water, surrounded with thick, impenetrable "woods, and overrun with slime. The air was vitiated, "noisome and thick, insomuch that the lighted torches "or candles burnt dim, and seemed ready to be extinguished; even the human voice lost its natural tone. "The smell of the ground, and of the houses, was raw "and offensive; but the vapour arising from the putrid "water in the ditches was much worse. All this, however, seemed tolerable, in respect of the infinite numbers of insects swarming every where, both on the "ground and in the air; which, as they seemed to be "produced and cherished by the putrefaction of the atmosphere, so they contributed greatly to increase its "impurity. The wild bees from the woods, together "with millions of ants, overran and destroyed the furniture; while swarms of cock-roaches often darkened "the air, and extinguished even the candles in their "flight; but the greatest plague was the musquitoes "and sand-flies, whose incessant buzz and painful stings "were more insupportable than any symptom of the fever. Besides all these, an incredible number of frogs, "on the banks of the river, made such a constant and "disagreeable croaking, that nothing but being accustomed to such an hideous noise, could permit the enjoyment of natural sleep. In the beginning of October, as the rains abated, the weather became very hot, "the woods were covered with abundance of dead frogs,

" and

“and other vermin, left by the recess of the river ; all
 “the mangroves and shrubs were likewise overspread
 “with stinking slime.”

No doubt these accounts are calculated to inspire us with dreadful ideas of the countries mentioned in them. What could be done by the putrefaction of dead animals and vegetables, certainly would be done here ; the produce, however, was not the true plague ; not even in *Catchou* ; but “a sickness which could not well be
 “characterised by any denomination commonly applied
 “to fevers ; it however approached nearest to what is
 “called a nervous fever, as the pulse was always low, and
 “the brain and nerves principally affected,” &c. Certainly if in any country heat, moisture and putrefaction could produce a plague, it would be in this. Yet, in all the places we have mentioned, whether India, Arabia, Egypt, or Guinea, (and we might go through the whole world in the same manner) we have not been able to find either moist heat or dry heat, even when aided by putrefaction, insects, and nastiness of all kinds (not justly chargeable upon any climate ;) I say, we have not found the united powers of all these able to produce a plague. Nay, it is even doubtful whether climates can produce those inferior diseases above mentioned. Even Dr. Lind, who appears to be so willing to ascribe every thing to climate, seems embarrassed in this respect. “There
 “are many difficulties (says he) which occur in assigning
 “a satisfactory reason, why in some countries, as in those
 “between the tropics, heavy and continual rains should
 “produce sickness ; while in other places, especially in
 “the southern parts of Europe, a want of rain for two or
 “three months in summer brings on diseases almost similar. Upon this occasion (adds the Doctor) I cannot
 “help observing, that there is hardly a physical cause
 “which can be assigned for the produce of any disease,
 “that will not admit of some exceptions : thus, not only
 “the woods and morasses in Guinea are tolerably healthy, with some exceptions, in the dry season ; but a few
 “instances might be produced of towns surrounded with
 “marshes and a foggy air, where the inhabitants suffer
 “no

“ no inconvenience from their situation, even during the
 “ rainy season. Do the impetuous torrents of water pour-
 “ ed from the clouds during the rainy seasons, in tropical
 “ countries, contain what is unfriendly to health? Thus
 “ much is certain, that the natives of such countries, espe-
 “ cially the mulattoes, avoid being exposed to these
 “ rains as much as possible, and when wet with them
 “ immediately plunge themselves into salt water, if near
 “ it. They generally bathe once a day, but never in
 “ the fresh water rivers, when overflown with rains,
 “ preferring at such times the water of springs. Is the
 “ sickness of these seasons to be ascribed to the intense
 “ heat of the then almost vertical sun; which frequent-
 “ ly, for an hour or two at noon, dispels the clouds, and
 “ with its direct beams instantly changes the refreshing
 “ coolness of the air into a heat almost insupportable?

“ Further: As the season of those sudden and terrible
 “ storms, called the hurricanes, in the East and West
 “ Indies, and tornadoes on the coast of Guinea, partly
 “ coincides with that of the rains, do these dreadful
 “ tempests in any measure contribute to produce the
 “ prevailing sickness at those times? It was remark-
 “ able one year at Senegal, that, in the beginning of the
 “ rainy season, in the night succeeding one of these tor-
 “ nadoes, a great number of the soldiers, and two thirds
 “ of the English women, were taken ill, this garrison
 “ before having been uncommonly healthy.

“ Lastly: Is it not more probable, as in those
 “ countries the earth for six or eight months in the
 “ year receives no moisture from the heavens but what
 “ falls in dews, which every night renew the vegetation,
 “ and reinstate the delightful verdure of the grass, that
 “ the surface of the ground in many places becomes
 “ hard and incrustated with a dry scurf, which pens up
 “ the vapours below, until, by the continuance of the
 “ rains for some time, this crust is softened, and the
 “ vapours set free? That these dews do not penetrate
 “ deep into the surface of the earth, is evident from the
 “ constant dryness and hardness of such spots of ground,
 “ in those countries, as are not covered with grass and

“ other vegetables. Thus the large rivers, in the dry
 “ season, being confined within narrow bounds, leave a
 “ great part of their channel uncovered, which, having
 “ its moisture totally exhaled, becomes a hard, dry crust ;
 “ but, no sooner the rains fall, than, by degrees, this
 “ long parched up crust of earth and clay gradually
 “ softens, and the ground, which before had not the
 “ least smell, begins to emit a stench, which in four or
 “ five weeks becomes exceeding noisome ; at which time
 “ the season of sickness commences.”

From these quotations it must certainly appear, that the author himself is dissatisfied with his theory ; and that, though in the outset he thought heat and moisture, assisted by the exhalations from putrid animal and vegetable substances, sufficient to produce the disorders of which he treats, yet, on a more minute investigation, he is obliged to acknowledge, that something inexplicable still remains. This he now wishes to solve by unknown properties in the water, by confined exhalations, &c. But as the consideration of these things belongs properly to the next section, I shall here only remark, that there hath not yet been given any satisfactory account of the origin of epidemic diseases of what I call the *inferior* kind, much less of the true plague, which stands above them all, as I have already said, like the serpent Python above other serpents.

To what has been quoted from Dr. Lind, I shall here subjoin the testimony of Dr. Clark, who had an opportunity of observing the epidemic diseases which raged at Bengal in 1768 and 1769. These were, “ the remittent
 “ fever and dysentery, which begin in August, and
 “ continue till November. During the beginning of
 “ the epidemic, the fever is attended with extreme malignity and danger ; frequently carrying off the patient
 “ in twelve hours ; and, if not stopped, generally proves
 “ fatal on the third or fourth day. In August the remissions are very imperceptible ; in October they
 “ become more distinct ; and, as the cold weather comes
 “ on, the fever becomes a regular intermittent. At
 “ that time, too, the putrid dysentery begins to rage
 “ with

“ with the fever. These diseases were very fatal to many Europeans, particularly new comers, in 1768. But
“ in the year 1770, when there was a scarcity of rice,
“ it was computed, that about eighty thousand natives,
“ and one thousand five hundred Europeans, died at
“ Bengal. The streets were covered with funerals; the
“ river floated with dead carcases; and every place exhibited the most melancholy scenes of disease and
“ death. During the sickly seasons at Bengal, the uncertainty of life is so great, that it frequently happens
“ that one may leave a friend at night in perfect health,
“ who shall not survive next day. There have been
“ several instances of persons who have returned home
“ in a state of perfect health from performing the last
“ duties to a deceased friend, and have next day been
“ numbered with the dead. But the cool, agreeable
“ season, from December to March, is productive of no
“ prevailing diseases. The complaints to be met with
“ are in general the consequences, or remains, of the diseases of the former period. The complaints which
“ the Europeans are subject to in the dry months are,
“ the cholera and diarrhœa. Fluxes and fevers are then
“ seldom epidemic; and, when they do happen, are not
“ attended with much danger.

“ At Batavia the rainy season is from November to
“ May, during which time malignant, remitting and
“ continued fevers and the dysentery rage with great fatality. Captain Cook, in his first voyage, arrived
“ here in October 1779; the whole crew, excepting
“ Tupia, a native of Otaheite, being in the most perfect
“ health. But, in the course of nine days, they experienced the fatal effects of the climate, and buried
“ seven people at Batavia. On the 3d of December,
“ the ship left the harbour. At that time the number
“ of sick amounted to forty; and the rest of the ship’s
“ company were in a very feeble condition. When the
“ ship anchored at Prince’s Island, in the Straits of
“ Sunda, the sickness increased, and they buried twenty-
“ three persons more in the course of about six weeks.
“ The Grenville Indiaman, which touched at this island
“ in

“ in 1771, suffered equally from the malignity of the
“ air. A few were taken on board, when the ship sailed
“ from Batavia, ill of a malignant fever ; which spread
“ by contagion at sea, and carried off great numbers.
“ I visited several in this ship, when she arrived at Chi-
“ na, who were reduced to mere skeletons, by the du-
“ ration of the fever and dysentery ; both of which were
“ most certainly propagated by contagion.

“ Those parts of Sumatra lying immediately under
“ the line are continually subject to rain, and the
“ ground near the shore is low, and covered with thick
“ trees and underwood. The heat being intense, noi-
“ some fogs arise, which corrupt the air, and render the
“ country fatal to foreigners. The land of North
“ Island, which lies on this coast, near the beginning of
“ the Straits of Sunda, appears at a distance finely vari-
“ egated ; but at the place where the wood and water
“ are to be got it is low, and covered with impenetrable
“ mangroves, and infested with a variety of insects. It
“ is here that most of the East India ships take in wood
“ for their homeward voyage. A Danish ship, in 1768,
“ anchored in this island, and sent twelve of her hands
“ on shore to fill water ; where they only remained two
“ nights. Every one of them was seized with a fever,
“ whereof none recovered : but although the ship went
“ out to sea, none, except the twelve who went on
“ shore, were attacked with the complaint.”

With regard to China, this author says, that the
“ port of Canton is by no means so healthy as is gene-
“ rally represented. The comparative degree of health
“ which Europeans enjoy here has been ascertained from
“ the instances of the supercargoes, which is, however,
“ a very erroneous standard. The generous and regular
“ way in which these gentlemen live, for the most part,
“ exempts them from diseases ; and, being but few in
“ number, no great mortality can take place among
“ them. But seamen, who never observe much regula-
“ rity in their way of living, who work hard in the
“ day time, are but badly clothed, and not provided
“ against the damps and cold north-easterly winds at
“ night,

“night, seldom fail to be afflicted with the diseases already mentioned (fevers and fluxes.) Even the factors of different nations, who reside here for any considerable time, experience all the inconveniences peculiar to any sultry climate : florid health is a stranger to their countenances ; their constitutions are soon weakened and enfeebled ; and they become subject to habitual fluxes and other complaints, the usual consequences of too great relaxation.”

The climate of the southern part of China, according to the same author, is excessively hot during the summer months. Even in September and October, when the nights are cold, the days continue to be sultry. The cold months are, December, January and February ; and during this time the vicissitudes of the weather are more quick than in any other part of the world. When the wind is northerly, and the thermometer at 46, upon a change of the wind to the south, it is next day up to 60 or 70. People who reside here are always at a loss with regard to their clothing ; one day finding a silk coat sufficient ; and the next, upon a sudden change of wind, finding it necessary to wear a flannel waistcoat.”

On the subject of climate, therefore, I must conclude with the following observations :—First : That, as the diseases above mentioned are produced both in moist and dry countries, in those in the torrid and those in the temperate zone, they can neither be the offspring of moisture or drought, of heat or cold, of septics or antiseptics, but of something not yet discovered. Second : That, upon fair investigation, it does not appear, that ancient historians have been able to ascertain the origin of any plague whatever : they have universally ascribed it to the anger of the Deity, while their own pride would never allow it to have originated in any country with which they were connected. Third : It doth not by any means appear, that the climates of those countries, where the plague is known to be most common, are at all inferior to those already described, excepting the very circumstance of having the plague frequently in them :
nay,

may, indeed, that they are equally bad. Nobody will pretend to argue, that the climate of Asia Minor, of Greece, of the Morea, or of any of the countries most infested with the plague, was, or is, worse than that of *Catchou* in Africa, already described; yet it is certain, that we have a number of testimonies that the plague has ravaged Asia Minor, while we have not one of its visiting *Catchou*. Ancient Greece, the Peloponnesus (Morea) and Asia Minor, were accounted healthy and fine countries; and modern travellers assure us, that they have not degenerated in this respect; yet these countries are desolated by the plague, while the unwholesome regions above described are entirely free from it, unless imported from some other quarter. To give this matter, however, as fair a discussion as possible, I shall here consider the account we have of the climate of Bassorah, given by the gentleman residing there in 1780; whose case, in the remitting fever, is given, Appendix, No. VI. “The overflowing of the Euphrates, “and its waters stagnating in the desert, have always “been accounted primary causes of epidemical diseases “at Bassorah. The great floods from the melting of “the snow on the mountains of Diarbekir, the ancient “Assyria, happened in the year 1780, early in the “month of May, when the heats in Persia and Arabia “begin to be excessive. The desert, which reaches to “the gates of Bassorah, is, for many miles, incrusted “with a surface of salt; which, when mixed with the “stagnated waters, and exposed to the sun, produces “the most noxious effluvia. As early as the 25th of “May, the town was surrounded by a salt marsh, the “heated steam arising from which was, at times, almost “intolerable; but the canal that runs through a great “part of the city being filled with the bodies of animals, and all kinds of putrid matter; and, at low “tides, all these substances exposed to the sun, made “the air in the town scarce supportable; and, being “totally destitute of police, the streets were in many “places covered with human ordure, the bodies of “dead dogs and cats, &c. which emitted a stench more “disagreeable

" disagreeable and putrid than any thing I ever experi-
 " enced in my life. As to the degree of solar heat, it
 " far exceeded what I conceived the human frame to be
 " capable of bearing. The sensation under this heat
 " was totally different from what I had ever experien-
 " ced ; it resembled the approach of an heated substance
 " to the body. The quicksilver, in Fahrenheit's ther-
 " mometer, rose to between 156 and 162 degrees.*
 " From the 30th of May I never saw it so low as 156,
 " but generally between 158 and 160. After I left
 " Bassorah I was told that it rose still higher. In the
 " coolest part of the house, with the aid of every inven-
 " tion to decrease the heat, the quicksilver rose to 115 ;
 " but after I came away, I was informed that it rose
 " still higher, even at seven in the morning, the hour
 " which we accounted the coolest in the day. Once
 " the heat was said to be so intolerable, that no one
 " could expose himself to it long enough to observe the
 " thermometer in the sun. Some of the oldest inhabi-
 " tants of Bassorah said that they never remembered to
 " have heard of such a heat in any part of Persia or
 " Arabia. The natives of the country appeared more
 " alarmed at the heat than the Europeans : nothing
 " could induce them to expose themselves to the sun
 " after ten o'clock. I left Bassorah for Aleppo on the
 " 30th of May. On our arrival at Zabira, the heat was
 " so intense, that even the Arabs sunk under it."

From this account it was natural to expect that vio-
 lent sickness would ensue. This was the opinion of the
 inhabitants, and they were not deceived. The sickness,
 however, was not the true plague, but a violent remit-
 ting fever ; and even this did not originate in the city
 itself, but was observed to approach from Asia Minor,
 ravaging Diarbekir, and keeping the course of the Ti-
 gris, to Bagdad, where many died. From thence it
 followed the course of the Euphrates to Bassorah, and
 for about twenty miles lower. The opposite, or Per-
 sian shore, though within a few miles, was exempted,
 and

* Spirit of wine boils at 175.

and it did not spread more than twenty miles into the desert.*

I might now proceed to give an abstract of what has been said of the power of climate in producing diseases on the Western Continent, and West India islands; but as this belongs more especially to the second part of this Treatise, I shall here pass it over, as well as what Dr. Smith has said of the climate of Greece, in the Medical Repository, and which he endeavours to prove to be similar to the climate of North America. But, before we proceed to consider what diseases may be produced by *climate* alone, it is proper to discuss the question, how far man is naturally subject to diseases of any kind? Many, no doubt, will be apt to suppose this a very absurd question; for as man is now, by nature, subject to death, it seems to follow, that he is also naturally subject to disease, as the means of bringing on death. But, however plausible this may appear, experience shows, that disease and death are not always connected. Many people die of mere old age; the powers of life being exhausted, and the system so far decayed, that the various parts of it can no longer perform their offices. On the other hand, a disease destroys by attacking some particular organ, and either totally consuming or altering it in such a manner, that it disturbs the vital operations, while yet strong and vigorous. We may therefore compare the death of a person from mere old age to the natural extinction of a candle when the tallow is totally consumed; and death from disease, to the blowing out of a candle while a part of it remains, and might have burned for a considerably longer time. Thus I am inclined to consider all diseases as merely accidental; and this with the greater certainty, because, though, in common with other believers in revealed religion, I think that death is the consequence of Adam's transgression, yet I do not find that disease of any kind was threatened except in cases of positive transgression, long after the days of Adam.

Every

* Transactions of Society for improving Medical Knowledge.

Every one allows, that, though some diseases are natural, some are likewise artificial; but nobody hath attempted to draw the line of démarcation between them. Every thing is charged upon climate, heat, moisture, drought, vapour, &c. and yet, upon examination, we shall find the utmost difficulty in deriving a single disease from the causes we assign. No person in his senses will say that Adam, in consequence of eating the forbidden fruit, became liable to the venereal disease. As little can we say for the gout, the stone, or the dropsy; and if we cannot particularize the diseases to which he became naturally liable, we have no right to say that any kind of disease became natural to him in consequence of his transgression. If, therefore, death itself, originally not natural to man, did yet take place in consequence of his moral conduct; and if diseases, without number, have arisen among his posterity, though not natural to him in consequence of his first transgression, we have equal reason to believe that these diseases have taken place among them in consequence of their moral or rather *immoral* conduct, in totally deviating from the line prescribed them by their Maker, and following others of their own invention; and this will appear the more probable, when we consider, that, long after mankind became subject to death, we find diseases, particularly the pestilence, threatened as the consequence of subsequent transgressions.

If, without taking scripture into consideration, we attend only to what may be gathered from profane history, we find the testimony of all the ancients concurring in one general point, viz. that in times of great antiquity men were more healthy, and even stronger, than in the times when those authors lived. This is taken notice of by Homer, when comparing the strength of men in the time of the Trojan war with those in his days, about two centuries later.* Virgil, who lived in much more modern

* A pond'rous stone bold Hector heav'd to throw,
Pointed above, and rough and gross below;
Not two strong men th' enormous weight could raise,
Such men as live in these degenerate days.

Iliad, B. xii.

modern times than Homer, carries his ideas of the degeneracy of man much farther ; and informs us, that Turnus, when fighting with Æneas, took up and threw a stone which twelve men of that time could not have lifted. Now, though we know that both these accounts are fabulous, yet they perfectly coincide with the voice of historians of all nations ; for we are universally told, that the first inhabitants of countries were a brave, hardy people, living according to the simplicity of nature, free from diseases, and attaining to a good old age.

This is so conformable to what is generally said at present, probably very often by rote, without regard to rational evidence, that, were we so inclined, ample room might be found for declamation against modern luxuries, particularly the practice of drinking ardent spirits, as pernicious to health, and destructive to the human body. On this subject, however, we may once for all observe, that, although we find ample evidence of the baleful influence of these liquors in producing other diseases, yet we find none of their ever having had any share in the production of an epidemic or general disease among mankind. In ancient times the art of distillation seems to have been unknown ; so that whatever mischief was done in those days must have been done by wine, or other fermented liquors. In modern times, though the use both of fermented liquors and ardent spirits is undoubtedly carried to excess, yet there is no evidence of their producing an epidemic, or even making it more violent or general than it would otherwise have been. Dr. Cleghorn, having spoken largely of the manner of living of the natives in Minorca, proceeds thus : “ I should next give a circumstantial account of the diet and way of life of the British soldiers in this island ; but as this would be a disagreeable task, I shall only observe, that the excess of drinking is among them an universal vice, confirmed into habit. But, however different the Spaniards be from the English, in their meat, drink, exercise, affections of the mind, and habit of body ; yet the health of both nations is equally influenced by
“ the

“ the seasons. An epidemical distemper seldom or
“ never attacks the one class of inhabitants without
“ attacking the other also ; and, surprising as it may
“ appear, it is nevertheless true, that the peasants,
“ remarkable for temperance and regularity, and the
“ soldiers, who, without meat and clothes, frequently
“ lie abroad drunk, exposed to all weathers, have dis-
“ eases almost similar, both as to their violence and
“ duration.”

There can be no doubt that excess in drinking hath put an end to the lives of many individuals ; and it hath been observed, that such as attempt to preserve themselves from the plague by the use of strong liquors, have generally fallen sacrifices to it ;* but this cannot prove that such excess would have brought on the distemper without some other cause. It hath been certainly found, that excess in drinking or eating, excess in venery, excessive fatigue by labour, watching, study, &c. will all make an epidemic disease more violent when it attacks a particular person ; but no experience hath yet shown that the *first* person seized with an epidemic always fell under this description. All that can be said on the subject is, that, by such excesses as have already been described, the body is prepared for receiving the disease, by an exhaustion, or evaporation (if we please to call it so) of the vital principle ; as wood is prepared for burning by the evaporation of its moisture ; but as wood, however dry, will not burn without the contact or application of fire, so neither will the body, though ever so well prepared, be attacked by any epidemic, unless the true cause of that epidemic be also applied.

Thus we are still disappointed in our attempts to discover the origin of the plague. We have seen that the most unhealthy climates in the world do not produce it of themselves ; neither can the conduct of any individual bring it upon himself, without an unknown *something*, which nobody has yet found out. It was this difficulty of finding out the natural cause, which certainly induced by far the greatest number of writers
on

* See Sec. IV. Preventives of the Plague.

on the subject to ascribe it to Divine Power ; and even as late a writer as Dr. Hodges tells us, that he believes in the *to Theion*, the “finger of God,” in the plague, as much as any body. As for those who have endeavoured to account for the origin of this distemper from an inquiry into natural causes, and conclusions drawn from the late experiments on air, they have totally failed ; as will be fully elucidated in the following section.

If then we are to believe that diseases, especially those called epidemics, among which the plague holds the first place, have arisen in consequence of a certain line of conduct adopted by the human race, or have been inflicted by the Deity as punishments on that account, we are to look for their origin among those to whom the Deity principally manifested himself ; that is, the Jews, and nations who interfered with them. Among the Jews we hear of the first general plague distinctly mentioned ; viz. the three days pestilence of David, and to which it is possible that Homer alludes in his *Iliad*. Next to this is the great plague of 767 B. C. said to have spread all over the world. This coincides with the time of Pul, king of Assyria ; who, having overthrown the ancient kingdom of Syria, turned his arms against that of Israel, and no doubt extended his conquests among the eastern nations, as we know very well the Assyrian monarchs did. As the ten tribes, ever after their separation from the house of David, had in a manner totally given themselves up to idolatry, we are not to wonder if the pestilence, so frequently threatened by Moses, was very common, or, as physicians term it, *endemic*, among them. Thus, whatever enemy invaded the country, would almost certainly carry the disease along with them, and spread it among the other nations with whom they afterwards had any connexion. At this time, or even before this, during the wars of Syria with Israel and Judah, this dreadful pestilence might begin ; but, as to its being all over the world in any particular year, I do not see how it can be ascertained ; because there are no general histories of the world in those early times. It appears more probable that this
general

general pestilence took place at the time that Sennacherib's army was destroyed. I have no doubt, indeed, for the reasons already given, that the plague had infected Sennacherib's army before he went into Ethiopia. In that country, in all probability, he would leave it; and, after his return to Judea, when the dreadful catastrophe befel him of an hundred and eighty-five thousand of his men being destroyed in one night, there can be no doubt that the remains of his army would carry with them the seeds of a most malignant pestilence, capable of spreading destruction far and wide. It is true, we are not directly told, in Scripture, that the Assyrian army was destroyed by a plague, but that the angel of the Lord destroyed them; but, as this expression is quite similar to what we read of the pestilence in David's time, there can be but little doubt that the means of destruction made use of in both cases were the same. Josephus expressly says, that Sennacherib's army was destroyed by a pestilence. Neither are we to conclude, because this pestilence was miraculous, that it therefore certainly killed every one on whom it fell; or that it would not infect those who came near the sick, as any other disease of the kind would do.

From the same source may we derive the propensity in the Carthaginian armies to pestilential disorders. Carthage was a colony of Tyre; and the Tyrians were in close alliance with the Jews, during the reigns of David and Solomon, and very probably afterwards; so that from them the distemper might be communicated in such a manner as to be almost endemic; and thus hardly an army could be sent out but what would have the infection with it, breaking out with violence now and then, as occasional causes tended to give life to the contagion. It is impossible, however, from the source just mentioned to trace the plague of Athens, or the first plague in Rome; but it is very natural to suppose that the violent one which raged in Rome, during the reign of Titus, came from Jerusalem. That city had sustained a most dreadful siege, and the obstinate and wretched inhabitants had endured such calamities as
have

have scarcely been recorded in the history of nations. Among these calamities was a pestilence, which, in all probability, would be conveyed to Rome, and there occasion the destruction already mentioned.

But what seems to render this account of the origin of the plague more probable is, that the Jews are to this day accused of propagating the disease in those countries where it is most frequent. Baron de Tott is of opinion that the plague in Constantinople originates among the Jewish dealers in old clothes ; for these avaricious dealers, purchasing the infected goods, sell them indiscriminately to every one who will buy, and that without the least care taken to remove the infection from them ; by which means it is no wonder to find the plague, as well as other diseases, disseminated among them in great plenty. Dr. Ruffel informs us, that the Jews are most liable to the plague, the most fearful of it, and the most ready to fly from the infection. The Abbe Mariti agrees in the same accusation against this unfortunate people. “ The
“ Jews (says he) purchase at a low price the goods and
“ wares which remain when most of the family are de-
“ ceased, and then store them up ; which, when the
“ plague is over, they sell at a dear rate to those will
“ buy, and thus propagate the pestilential poison : again
“ it kindles, and presently causes new destruction.
“ Thus this opprobrious nation, preferring gold to life,
“ sell the plague to Mussulmen, who purchase it with-
“ out fear, and sleep with it, till, renewed of itself, it
“ hurries them to the grave.” M. Volney, though he does not mention the Jews in such express terms as Mariti and Ruffel, yet agrees as to the mode of its propagation in Constantinople, and the reason of its continuance in that city. “ It is certain (says he) that the
“ plague originates in Constantinople, where it is per-
“ petuated by the absurd negligence of the Turks,
“ which is so great, that they publicly sell the effects of
“ persons dead of the distemper. The ships which go
“ to Alexandria never fail to carry furs and woollen
“ clothes, purchased on these occasions, which they ex-
“ pose to sale in the bazar of the city, and thereby spread
“ the

“ the contagion. The Greeks who deal in these goods
“ are almost always the first victims.”

Thus the account we have of the origin of the plague at present is, that the city of Constantinople, having been long and deeply infected, the infection is stored up through the avarice of the Jewish merchants, who buy the goods and clothes of the infected. The stupidity of the Turks allows these goods to be sold in Constantinople, or exported freely to all parts to which their vessels sail, particularly to Alexandria; where the avarice of the Greeks prompts them to buy without examination or precaution, to the destruction of their own lives, and of multitudes of others. Egypt being the principal place of traffick, the plague is more frequent there than in other parts of the empire. Syria is comparatively free from it; which M. Volney supposes to be owing to the small number of vessels which come there directly from Constantinople.

In this way we may, in a pretty plausible manner, account for the origin of this distemper; viz. that it originally fell upon the Jews as a punishment for their iniquities; that from the Jews it has been at different times conveyed to other nations; and, by a mixture of those nations, has, at times, become general all over the world. At last it has, by the avarice of that people who first had been the occasion of its being introduced into the world, become permanent in Constantinople, whence it is still diffused among different nations in proportion to their dealings with that capital.

But it may now be said, ‘Allowing the positions contended for to be true in their utmost extent, how comes it to pass that the plague hath not been general in every age and in every country? Since the destruction of Jerusalem, the Jews have been dispersed over all nations: if nothing then were wanting to produce a pestilence but Jews and old clothes, no age or country ought to have been free from it; nevertheless it is certain that violent plagues take place only at particular times, with long intervals between; and of late the pestilential disposition seems to have become much less frequent

frequent than formerly; the western parts of Europe, particularly Britain, having been free from it for a great number of years. There must therefore be some cause, different from what has yet been mentioned, by which the infection is occasionally roused from inactivity, and excited to spread desolation all around.'

That there are predisposing causes to epidemic disorders, especially to the plague, the most fatal of them all, is not denied. These prepare the body for receiving the infection, but they will not, without that infection, produce the disorder. Of these causes so many are to be found in the conduct of mankind themselves, that we scarcely need to look for them any where else. In looking over the histories of plagues, we find them in an especial manner connected with famines and wars. The former sometimes take place in consequence of the failure of crops through natural causes; but, considering the general fertility of the earth, we must certainly account it owing to bad management, in some respect or other, that every country hath not as much laid up within itself as would guard against the consequences of at least one or two bad crops. Yet we believe there is not, at present, a country upon earth in this predicament. If a crop fails any where, the inhabitants must import largely, or they must starve. This is the case even in the fertile regions of the East, where the earth produces in excessive abundance,* and there is little or nothing of any kind of provision exported to other countries. A remarkable instance of this occurred in the plague at Aleppo, a history of which is given by Dr. Ruffel. He tells us, that the winter of 1756 proved excessively cold, which was followed by a famine next year. This account is confirmed by Mr. Dawes, in a letter to the bishop of Carlisle.† He tells us, that in the course of the winter many perished through cold; that the inhabitants were reduced to such extremities, by the single failure of the crop in 1757, that women were

* Herodotus says, that in his time the province of Babylonia produced commonly two hundred, and in plentiful years three hundred fold.

† Philos. Transact. vol. liv.

were known to eat their own children as soon as they expired in their arms with hunger ; and that human creatures might be seen contending with dogs, and scratching for the same bone with them in a dunghill. A dreadful plague followed ; which, the two succeeding years, swept off not fewer than sixty thousand in the city of Aleppo.

It is probable that in this case the famine either produced the plague, or made it worse than it would have otherwise been ; and it is not denied that the cold and bad season was the direct cause of the famine. But as little can it be denied, that had the people, or their governors, been so provident as to have laid up stores sufficient to supply the country for one year, this famine would not have been felt. As far, therefore, as the plague was connected with the famine, we must own that it was chargeable on the human race themselves ; not the sins of this or that particular person, but a general deviation from the task assigned them by their Maker, viz. that of cultivating the ground ; and, instead of this, spending their time in folly and trifling, to say no worse.

But famines are occasioned not only by natural causes, but by wars ; in which mankind, acting in direct opposition to the laws of God and nature, destroy and lay waste the earth, taking every opportunity of reducing to extremity both those whom they call innocent and those whom they call guilty. Thus vast multitudes are reduced to want, to despair, and rendered a prey to grief, terror, and every depressing passion of the human mind ; they are exposed to every inclemency of the weather ; to the scorching heats of the day, and the chilling damps of the night ; in short, to every thing that we can conceive capable of predisposing the body for the reception of diseases of the very worst kind. No wonder therefore that war and pestilence go hand in hand ; and, by taking a review of the history of mankind, we shall see, that, always at those times when the nations have been most actively employed in the trade of butchering one another, then, or very soon after, they have been afflicted

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with

with pestilence. To begin with the great plague of 767 B. C. which coincides with the rise of the Assyrian empire: Till this time, though there had been numberless wars, yet they were carried on upon a much smaller scale than now, when great empires were to be set up, and when the most distant nations were to be assembled in order to gratify the pride and ambition of an individual. The Assyrians, we know, penetrated into Ethiopia; but how far east or how far west they went, we are not certainly informed. To their wars, however, we may with reason ascribe the desolations occasioned by this first plague. From Thucydides's account of the plague at Athens, it seems plain that it was occasioned, or at least rendered more violent, by the wars of the Greeks with one another at that time. Had the Carthaginian army staid at home when they went to war with Dionysius, tyrant of Syracuse,* it is very probable that the pestilence would not have broke out among them. The like may be said of the plague which broke out among them in the time of Marcellus.† That in the time of Jugurtha, indeed, is said to have been occasioned by locusts; but, had not vast bodies of men been collected together for the purposes of war, the plague could never have committed such ravages. The plague in the time of Titus could not have been brought from Jerusalem, nor perhaps would it have existed there, had not Titus made war against that city; and so of others.

The plague which began in the reign of Justinian, as it was more violent than any recorded in history, so it was preceded by wars equally unexampled. The Romans had indeed for ages employed themselves in war; but, by their constant superiority to every adversary, their empire had become so amazingly extensive, that, whatever wars were carried on in the remote provinces, the great body of the empire always remained at peace; and this was the case even in their most violent civil wars. On the accession of Alexander Severus, about the year 232, they began to encounter enemies so numerous and formidable, that all their power proved insufficient to repel them. In the tenth year of Alexander's

* See Sec. i. p. 10.

† Ibid. p. 12.

ander's reign, the Persians, having overthrown the ancient empire of the Parthians, turned their arms against the Romans, and, though frequently defeated at that time with great slaughter, renewed their incursions in the reign of Gordian, about the year 242, when they were in like manner defeated and obliged to retire. As these defeats, however, did not at all affect the strength of the Persian empire, the Romans still found them as formidable enemies as ever; while the Goths, Sarmatians, Franks, and other northern nations, harassed them in other parts. In the reign of Decius, who ascended the throne in 249, they became extremely formidable, insomuch that the emperor himself, with his whole army, was at last cut off by them. The consequence of this was, that the empire was instantly invaded in many different parts, and, though the barbarians were at times defeated, we never find that the empire regained its former tranquillity. The Persians and Scythians, taking advantage of the general confusion, invaded the provinces next them, while the finishing stroke seemed to be given to the Roman affairs by the defeat and captivity of Valerian by the Persians.

This disaster, as may well be imagined, produced an immediate invasion by numberless barbarians, while such multitudes of pretenders to the imperial crown were set up, each asserting his claim by force of arms, that the whole Roman territories were filled with bloodshed and slaughter. At this time Gallienus, the son of Valerian, was the *lawful* emperor, if indeed we may apply the word to the domination of such a monster. His mode of government may be imagined from the following letter written to one of his officers in consequence of a victory gained over an usurper named *Ingenuus*.
“ I shall not be satisfied with your putting to death only
“ such as have borne arms against me, and might
“ have fallen in the field : you must in every city destroy
“ all the males, old and young ; spare none who have
“ *wished* ill to me, none who have spoken ill of me, the
“ son of Valerian, the father and brother of princes.
“ *Ingenuus* emperor ! Tear, kill, cut in pieces, without
“ mercy ;

“mercy: you understand me; do then as you know
 “I would do, who have written to you with my own
 “hand.” In consequence of this horrible order, not
 a single male child was left alive in some of the cities
 of Mœsia, where this inhuman tragedy was acted.

In the midst of this dreadful commotion, we find the
 pestilence contributing its share to the common work of
 desolation. In Alexandria in Egypt, says Dionysius,
 bishop of that place, “fury and discord raged to such
 “a degree, that it was more easy to pass from the east
 “to the remotest provinces of the west, than from one
 “place of Alexandria to another. The inhabitants had
 “no intercourse but by letters, which were with the
 “utmost difficulty conveyed from one friend to another.
 “The port resembled the shores of the Red Sea strewed
 “with the carcases of the drowned Egyptians: the sea
 “was dyed with blood, and the Nile choked up with
 “dead bodies. The war was attended with a general
 “famine, and the famine with a dreadful plague, which
 “daily swept off great numbers of people, insomuch
 “that there were then in Alexandria fewer inhabitants,
 “from the age of fourteen to that of eighty, than there
 “used to be from forty to seventy.” It was not in
 Egypt alone that this calamity prevailed. It raged with
 great violence in Greece, and at Rome itself; where,
 for some time, it carried off five thousand persons a day.
 Many terrible phenomena of nature took place at the
 same time. The sun was overcast with thick clouds,
 and great darkness took place for several days, attended
 with a violent earthquake, and loud claps of thunder,
 not in the air, but in the bowels of the earth, which
 opened in several places and swallowed up great num-
 bers of people in their habitations. The sea, swelling
 beyond measure, broke in upon the continent, and
 drowned whole cities.*

At last the civil commotions were settled by the
 accession of Claudius to the empire in 268. He found
 the Roman force so exhausted, that, when marching
 against the Goths, he wrote to the senate in the following
 terms:

* Univ. Hist. vol. xvi. p p. 433. 435.

terms : " If I should not be attended with success, you
" will remember that I fight after the reign of Gallienus.
" The whole empire is quite spent and exhausted, partly
" by him, and partly by the many tyrants who, during
" his reign, usurped the sovereignty, and laid waste our
" provinces. We want even shields, swords and spears."
In this miserable plight, however, he gained a most
extraordinary victory ; three hundred thousand of the
enemy being killed or taken. But, while Claudius thus
carried on the work of death successfully against the
barbarians, he was attacked from a quarter where he
could make no resistance : a violent plague broke out in
his army, and carried off himself and a vast number of
his men.

The dreadful defeat given to the Goths did not long
preserve the tranquillity of the empire. New invasions
took place, and new massacres ensued. At last, on the
accession of Dioclesian to the empire, it was thought
proper, on account of the present emergencies, to divide
such wide-extended territories into four parts, to be
governed by four emperors of equal authority. By the
activity and valour of these, particularly of one of them,
named Galerius, the northern barbarians were repressed,
and the Persians reduced so low, that they were obliged
to yield up a great part of their territories ; and it is said
that their country might even have been reduced to a
Roman province, had the emperor so inclined. We
know not whether, in his eastern expedition, the Roman
army received any infection, nor do we hear of any
plague breaking out in it ; but we are told that Galerius
himself died of an uncommon distemper ; an ulcer,
attended with mortifications, violent pains, and the pro-
duction of an infinite number of vermin, which devoured
and tormented him day and night. This distemper,
however, seems rather to have been a cancer than a
pestilential disorder, as he laboured under it for more
than a year. After his death, dreadful wars continued,
both by reason of the incursions of barbarians, and the
contests of those who enjoyed, or wished to enjoy, the
empire. The eastern parts, however, had for some
time

time kept free from pestilential contagion ; of which the christian writers say, that Maximin, who reigned there, had made his boast ; and, being a heathen, ascribed it to the care he took of preserving the worship of the gods. But, if this was really the case, he soon found his gods unable to protect him ; for, soon after the accession of Constantine the great, and his embracing christianity, the dominions of Maximin were afflicted with famine accompanied with pestilence, and that attended by symptoms of a most extraordinary nature ; particularly ulcers about the eyes, which rendered multitudes of those who were infected with the distemper totally blind. The christians did not fail to ascribe this plague to the sins of Maximin ; but it must be observed, that to his other sins he had added that of involving himself in a violent war, during which the pestilence broke out, and which probably was one of the causes of it. We may likewise observe, that if the sins of Maximin brought on the plague, the piety of Constantine could not keep it off ; since we find that in the year 332, a considerable time after the death of Maximin, the territories of Constantine were ravaged by a dreadful plague, and the famine was so severe, that, at Antioch, wheat was sold at four hundred pieces of silver per bushel. The distemper which put an end to the life of Maximin himself was indeed so extraordinary, that we may reasonably excuse those who called it a judgment sent directly from heaven. His eyes and tongue are said to have putrefied ; “ an invisible fire was kindled
“ in his bowels, which, being attended with unrelenting
“ torments, reduced him in a few days to a perfect
“ skeleton ; his whole body was covered over with a
“ kind of leprosy, and devoured by swarms of vermin :
“ he could not be prevailed upon to take any nourish-
“ ment, but greedily swallowed handfuls of earth, as if
“ he had hoped by that means to assuage his pains, and
“ allay the hunger with which he was tormented with-
“ out intermission.”* All this, we are told, was the effect of poison, which he had swallowed in despair,
after

* Univ. Hist. vol. xvi.

after being defeated in battle; but the symptoms are unaccountable.

After the death of Constantine, the empire being again parted, civil dissensions took place; the northern barbarians and Persians renewed their incursions, and at length the battle of Murfa, between the emperor Constantius and an usurper named Magnentius, destroyed such numbers that the empire no more recovered its former strength. From this time therefore the wars with the barbarians became more and more violent; and, though frequently overcome, the advantage was ultimately on their side. In 361, the first year of the emperor Julian, the pestilence again made its appearance. It was accompanied by many other grievous calamities: Dreadful earthquakes were felt in every province; most of the cities in Palestine, Libya, Sicily and Greece, were overturned. Libanius writes, that not one city in Libya was left standing, and but one in Greece; that Nice was utterly ruined, and Constantinople greatly damaged. The sea, in several places, broke in upon the land, and destroyed whole cities with their inhabitants. At Alexandria, the sea, retiring during an earthquake, returned again with such violence, that it drowned several towns and villages in the neighbourhood. The earthquakes were followed by a famine, and the famine by a pestilence. It was observed by the christian writers, that the famine seemed to follow Julian from place to place: and no wonder that it did so; for he not only had always a large army along with him, which consumed great quantities of provision, but, attempting to remedy the evil by fixing the prices of provisions, he rendered it much worse, as the dealers in corn were thereby tempted to convey it to other places.* Indeed this emperor seems to have been inclined to produce famines wherever he went; for, on his entering the territories of the Persians, with whom he was at war, he wasted the country to such a degree, that he could neither subsist nor return; while the enemy, imitating his example, destroyed all before him. The consequence was, that,

* Univ. Hist. vol. xvi.

that, by the time Julian was killed, the famine raged in the Roman camp to such a degree, that not a single person could have escaped, had not the enemy mercifully granted them peace.

Notwithstanding this dismal situation, we hear of no plague invading the camp of the Romans at that time. The wars, however, continued with great violence ; and, in the time of Valentinian, Valens and Gratian, became worse than ever. The dreadful state of the empire in the time of Gratian is thus described by St. Jerom :
 “ The whole country, from Constantinople to the Julian
 “ Alps, has been swimming these twenty years in Roman
 “ blood. Scythia, Thrace, Macedon, Dardania, Dacia,
 “ Theffaly, Achaia, both Epiruses, Dalmatia, both Pan-
 “ nonias, are filled with Goths, Sarmatians, Quadians;
 “ Alans, Huns, Vandals, Marcomans, &c. whose avarice
 “ nothing has escaped, whose cruelty has been felt by
 “ persons of all ranks, ages and conditions.” “ What
 “ evils, (says Gregory Nazianzen) have we not seen or
 “ heard of ! Whole countries have been destroyed with
 “ fire and sword ; many thousand persons of all ranks
 “ and ages have been inhumanly massacred ; the rivers
 “ are still dyed with blood, and the ground covered with
 “ heaps of dead bodies.”

In the midst of so great calamities, the pestilence, as an evil of inferior nature, might in many cases pass unnoticed by the historians of the times ; nevertheless, even during that distracted period, we find some accounts of it. In 384 we are told of a famine and plague at Antioch ; and, in 407, of one in Palestine, said to be occasioned by multitudes of grasshoppers, which even obscured the sun, and turned day into night. After having done incredible mischief, they were thrown by the wind partly into the Red Sea, and partly into the Mediterranean ; whence being again cast ashore by the waves, they putrefied, and occasioned a pestilence. Two years after, when Rome had been first besieged by Alaric the Goth, the city was reduced to such straits, that human flesh was publicly sold, and some mothers are said to have devoured their children. This terrible famine was
 occasioned

occasioned by the uncultivated state of the country, which had lain waste for several years, by reason of the wars, and the ports of Africa being blocked up by Heraclianus left an usurper should become emperor; and thus this loyal admiral, for fear that the people should have a bad governor, determined rather that there should be no people to be governed. Notwithstanding this terrible famine, however, we hear of no pestilential disorder taking place; not even after the taking of the city by Alaric, when bloodshed and massacre were added to the other calamities.

All this time the empire, by the incursions of barbarians, by usurpations, civil wars, and the general licentiousness of the people, had been in a situation not to be described. The invasion of the Hunns, a new and more formidable enemy than they had ever experienced, now completed the ruin of the Romans. The whole western part of the empire became one continued scene of carnage and desolation. The common epithet bestowed upon Attila, the king of these barbarians, was, "The *Scourge* of God, the *Destroyer* of *Armies*." As a specimen of his behaviour, we shall select the account of his taking of Aquileia in 452. That city, "being well fortified, and defended by the flower of the Roman troops, held out, in spite of his utmost efforts, for three months; at the end of which it was taken by assault, pillaged for several days together, and laid in ashes; not a single house being left standing, nor one person alive that fell into the enemy's hands. The cities of Treviso, Verona, Mantua, Cremona, Brescia and Bergamo, underwent the same fate; the barbarians raging every where with such fury as can hardly be expressed or conceived, and putting all to the sword, without distinction of sex, age, or condition."*

Every one must own that this was a very effectual method of preventing the plague in those cities. It did not, however, prevent that, or some other diseases, from destroying such numbers of the tyrant's troops, that he was for that time prevented from taking Rome itself.

From

* Univ. Hist. vol. xvi.

From this time, to the total extinction of the western empire, we do not hear of any remarkable infection taking place. The barbarians still continued their wars with one another, while the emperors of Constantinople were likewise at continual variance with the Persians. At last, in the year 532, they concluded what they called a *perpetual* or *eternal* peace, which lasted *eight years* ! Other treaties and truces were concluded ; notwithstanding which, the war was almost continual in the east ; while, by the second conquest of Italy, and the invasion of the Gothic territories, new desolations overspread the west. Thus, for a great number of ages, mankind had been preparing themselves for the dreadful pestilence which was about to ensue. Whatever infection could be communicated to the air by multitudes of carcases rotting above ground had been done in an ample manner. Whatever debility could be communicated to the human frame by famine, exposure to the inclemency of weather, by fatigue, terror, grief, and every thing that can render life miserable, had also been communicated by the most powerful means. There only wanted *something* to begin the calamity ; and this, whatever it was, took place in the fifteenth year of Justinian. Mr. Gibbon ascribes the origin of it to locusts ; and its universality, to the general mixture of all nations, and the unrestrained intercourse they had with one another. “ No
“ restraints (says he) were imposed on the frequent inter-
“ course of the Roman provinces. From Persia to
“ France the nations were mingled by wars and emigra-
“ tions ; and the pestilential odour, which lurks for years
“ in a bale of cotton, was imported, by the abuse of
“ trade, into the most distant regions. Procopius relates,
“ that it spread always from the sea-coast to the inland
“ countries : the most sequestered islands and mountains
“ were successively visited ; the places which had escaped
“ the fury of its first passage, were alone exposed to the
“ contagion of the ensuing year. In time, its malignity
“ was abated and dispersed ; the disease alternately lan-
“ guished and revived ; but it was not till the end of a
“ calamitous period of fifty-two years, that mankind re-
covered

“covered their health, or the air resumed its pure and “salubrious qualities.”

Thus Mr. Gibbon endeavours to explain the causes of this plague from an alteration in the salubrity of the atmosphere, without taking into consideration the dreadful commotions among mankind, above related. But, now that we have noticed two very general infections, one in 767 B. C. the other 1300 years after, we find them both preceded and accompanied by wars uncommonly violent and destructive. The great plague in the time of Justinian is said by Mr. Gibbon to have continued only fifty-two years; but this we must understand of its first and most violent attack; for it appears, from the testimonies produced in the former section, that pestilential disorders, even very violent ones, continued at intervals for several centuries. Thus, from the year 541 to 593, the space of fifty-two years is included; nevertheless, in the time of Phocas, who began to reign ten years after, the same calamity continued; as did also violent wars with the Persians and other barbarians.

The year 622 is remarkable for the flight of Mahomet from Mecca to Medina, from which time we may date the rise of the empire of the Saracens; a people who, for desolation and destruction, were perhaps never equalled except by the Hunns and Moguls. In 630 the impostor himself died, after having just united the Arabs or Saracens, and fitted them for the work in which they were to be employed. Their first exploit was, to fall upon the empire of Persia, now weakened by its endless wars with the Romans. This was conquered in two years; after which they broke into Palestine, and conquered the provinces bordering upon Syria. In 634 they reduced Syria itself and Egypt. In 636 they took and plundered Jerusalem. In 642 they conquered the African provinces, and reduced some of the islands in the Levant. With unabated fury they proceeded to the east and west; laying siege, in 668, to Constantinople itself, where they received their first check by the shipwreck of their fleet, and the defeat of their army. Thus,

Thus, in the space of 38 years, the immense tract of country from the eastern part of Persia to the confines of the Mediterranean Sea, with the northern coasts of Africa, the whole including a space scarce inferior to the empire of Alexander the Great, was reduced under subjection to a race of savage barbarians, who knew only how to plunder, destroy, and reduce other nations to slavery.

In this manner were the eastern parts of the world prepared for a new infection, supposing the old one to have been entirely gone off. The Saracens pursued their good fortune, ravaged and conquered from India to Spain, and from Spain were proceeding northward through France, to extend their conquests to the other countries of Europe. But here, in 728, their fury was stopped by Charles Martel, the father of Pepin, and grandfather of Charles the Great. After a most obstinate and bloody battle, which lasted seven days, and in which the barbarians lost three hundred and seventy-five thousand men,* they were driven beyond the Pyrenean mountains, and never after durst enter France. Thus was one fury stopped, only to give place to another. Charles, as ambitious and as cruel as the Saracens, having in vain attempted the conquest of Spain, reduced Italy and Germany; and, having dreadfully massacred the Saxons, and almost exterminated the Hunns, set up the German Empire, and was crowned emperor of the West in 800.

While the nations were thus deluging the earth with blood, the pestilence made its appearance in the east, attended with extraordinary phenomena.† Some of these are taken notice of by the Arabian historians, and others are mentioned by them, concerning which the Greek histories are

* M. Millot places this account among the "exaggerations which ought not to have a place in history;" but, as we have no evidence for or against the fact, it was thought proper to let it remain as related by the historians of those times. It is certain that in those days mankind assembled for the purposes of bloodshed and slaughter in prodigious numbers; the destruction was commonly in proportion to the numbers assembled. The account is not more incredible than that of Tamerlane's filling up the harbour of Smyrna by causing each of his soldiers to throw a stone into it. Such an army could have spared the number in question.

† See Sec. i.

are silent. In 636, particularly, we hear of violent storms of hail throughout the Arabian Peninsula, and of Syria being ravaged by epidemic distempers. It would seem, indeed, that the plague, during the whole of these horrible periods, had never been extinguished; for in 671 they tell us that a celebrated Arab, named *Ziyad*, died of the plague; though neither Greek nor Arabian historians take notice of any remarkable pestilence as raging at that time. We are told that this man was attended by no fewer than *an hundred and fifty* physicians.* “But, *as the decree was sealed, and the thing determined*, they found it impossible to save him.” This distemper was attended with such an excruciating pain in his right hand, that the unhappy patient had recourse to a *cadi*, or judge, to inform him whether he might lawfully cut it off. The judge determined that it was absolutely unlawful to do so; notwithstanding which, *Ziyad* resolved to proceed: but his heart failed him when he saw the instruments and cauterising irons to be employed in the operation; for in those times of barbarity and ignorance they knew no other method of stopping blood but by a hot iron; and therefore some of the physicians in ancient times, when a limb was to be cut off, ordered the incision to be made down to the bone with a red hot razor. But, to return to our subject: In Syria and Mesopotamia swarms of locusts infested the earth about the year 679; but, as it seems extremely probable that the plague was never out of the eastern regions, we cannot expect to hear much of it, unless when extremely violent. That in the time of Constantine Copronymus seems to have extended over Arabia, as we are told that the Khalif Yezid, who was cotemporary with Copronymus, died of the plague. We are also told, that the earthquakes which afflicted the territories of the Greek emperors extended themselves to the countries about the Caspian Sea. In those ages indeed the phenomena of nature appear to have been so extraordinary, that we can scarcely account them any other than miraculous. Some of these have been described in the former

* Modern Univ. Hist. Arabia.

former section, on the authority of the Greek historians : the Arabians make mention of others similar. They tell us, also, that once or twice it rained black stones, and that some of these were so inflammable, that an Arab having attempted to make a fire with one of them in his tent, it burst out into such a violent flame as consumed the tent altogether.* This rain may be accounted for from the explosion of a volcano ; but how shall we account for the sun himself losing his light ? a phenomenon acknowledged even by Mr. Gibbon ; though that author huddles things together in such a manner as seems totally inconsistent with the regular chain of events. He tells us, that the dreadful plague, which broke out in the time of Justinian, was preceded by comets, and most violent earthquakes ; and that these comets were attended with an extraordinary paleness of the sun. This may be ; but the word *paleness* cannot apply to the *darkness* which lasted from the fourth of August to the first of October, and to which he seems to allude, though it happened long after the time of Justinian ; neither can it be applied to what I am now about to relate, viz. that in the year 782, a little after sunrise, the solar light was lost without an eclipse, and the darkness continued till noon. It is impossible to read the histories of those times without remembering the words of our Saviour, that there should be signs in the sun and in the moon, distress and perplexity of nations, the sea and waves roaring, men's hearts failing them for fear, &c. But, however the God of nature might thus intimate to mankind his displeasure with their proceedings, it is certain they made no alteration in their conduct. The Saracens, having conquered immense tracts of country, engaged in civil wars among themselves ; the western nations, after having tried in
vain

* That such accounts are not to be looked upon as entirely fabulous, may be gathered from what is related by Mr. Thomson in his travels through Palestine, viz. that on the brink of the lake Asphaltites he found numbers of "small black pebbles, which are soon set on fire by being held in the flame of a candle, and yield a smoke intolerably stinking and offensive ; but have this remarkable property, that by burning they lose nothing of their weight, nor suffer any diminution in their bulk. They are capable of taking as fine a polish as black marble, and are likewise said to be met with of considerable size in the neighbouring mountains."

vain to destroy each other, at last united in a romantic design of conquering Palestine from the Infidels ; while the Turks, leaving their habitations about Mount Caucasus, where, like the vultures of Prometheus, they had for ages remained unseen and unknown, precipitated themselves upon the Greeks and Saracens, and lastly, as if all hell had broke loose at once, the Moguls, from the most easterly part of Asia, poured destruction upon the countries to the west, even as far as Russia and Poland.

All these events took place in a few centuries. In 844 the Turks quitted Mount Caucasus, and settled in Armenia Major. In 1030 they fell upon the Saracen empire, now divided among innumerable chieftains continually at war with each other. Among these was one called the Sultan of Persia, and another of Babylon. The former being worsted, called in the Turks to his assistance. They sent him an auxiliary army of only *three thousand* men ; and from this slender beginning has arisen the vast empire of the Ottoman Porte. The three thousand men were commanded by a general called by the Greeks *Tangrolipix*, and by the Asiatics *Togrul Beg*. Being a man of ability, the Sultan of Persia, by his assistance, got the better of his adversary ; but, refusing to let the Turks depart, Tangrolipix with his army withdrew to the desert of Carbonitis, where, being joined by numbers of discontented Persians, he began to invade the territories of the Saracens. The Sultan of Persia sent against him an army of twenty thousand men, whom Tangrolipix surprised and defeated, acquiring at the same time an immense booty. The fame of his victory, and his wealth, procured him bands of robbers, thieves, and blackguards, from all the neighbouring countries ; so that he soon found himself at the head of fifty thousand. Against such a formidable force the Sultan of Persia marched in person ; but happening to lose his life in the engagement by a fall from his horse, his men threw down their arms and acknowledged Tangrolipix to be Sultan of Persia.

The new sultan instantly thought of destroying other sultans and potentates ; for which purpose he opened a
passage

passage for his countrymen from Armenia to Persia: The Sultan of Babylon was the first victim; after which Tangrolipix turned his arms unsuccessfully against the Arabians, but afterwards more successfully against the Greek emperors. The first invasion by the Turks took place in 1041; and in four hundred and twelve years they became absolute masters of the empire. Though unsuccessful at first against the Saracens, they prevailed greatly afterwards, and, by the time of the crusades, we find them masters of Palestine, as well as several other countries formerly conquered by the Arabs. From the time of their first invasion, in 1041, we may say, the war never ceased; and there is the greatest reason to suppose that the Greek empire would have been overthrown in a very short time, had not the crusaders checked their progress. The immense numbers with whom the barbarians had now to contend (amounting to no fewer than seven hundred thousand) threatened with destruction the newly erected empire of the Turks; and had it not been for the want of unanimity among the crusaders themselves, and the jealousy of the emperors of Constantinople, they certainly would have overthrown it. But, as matters went, all their labour was lost; and they only increased the general carnage and desolation to an extreme degree. The first crusade was planned in 1093, published in 1095, and in March 1096 the first army set out. In 1097 they began their conquests, but soon found it very difficult to keep them. The Turks being at home, and united, had many advantages over foreign invaders; which the latter endeavoured to counteract by drawing continual supplies of fresh men from Europe. Thus, for several centuries, the western part of Asia was rendered a scene of bloodshed and desolation. When they had contended for something more than *two hundred* years, Jenghiz Khan, the Mogul, seems to have formed the *noble* design of destroying the whole human race at once, excepting only his own immediate followers. His plan was, to *exterminate* man, woman and child wherever he went, and to plant the countries with his own people. It is impossible to do justice to
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his exploits. Voltaire, speaking of the irruption of the Moguls, says, that the people fled every where before them; like wild beasts roused from their dens by other beasts more savage than themselves. In the Universal History we are told, that he is supposed to have destroyed *fourteen millions and an half* of his fellow creatures. He died in 1227, and left successors worthy of himself. Some of these proceeded eastward, and some westward. The latter, under the conduct of a *monster* named *Hulaku*, overthrew, in the year 1256, the remains of the Saracen empire, by the taking of Bagdad. The miserable Khalif, coming forth to meet his conqueror, was trampled under his horse's feet, then sewed up in a sack, dragged through the streets, and thrown into the river. The Moguls who proceeded eastward invaded China. The Chinese resisted with innumerable multitudes, and battles were fought to which those of the present age are mere skirmishes. The soldiers, overcome with thirst, drank blood instead of water; hundreds of thousands fell on both sides, while human blood ran in streams for five or six miles. At last the fury of the Moguls was stopped by the ocean; for, having attempted the conquest of Japan, their fleet was wrecked, and an hundred thousand perished. Like other great empires, also, pretenders to the sovereignty started up, and the whole was parcelled out into a number of little states, which, of course, ceased to be formidable.

The decline of the Mogul empire did not restore peace to the world. The Turks continued their ravages; the western nations continued their crusades. England, which became a kingdom in 800, had been ravaged and conquered by the Danes and Normans, and likewise distressed by civil wars. At last, having emerged from its own difficulties, it began to inflict upon other nations the miseries itself had endured. Wales and Scotland became objects of the ambition of Edward I, who had already signalized his valour in the crusade. The Welsh were totally subjugated, and the Scots overthrown in the very bloody battle of Falkirk, where almost the whole force of the country was destroyed. The Scots,

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however, were never totally subdued. Robert Bruce retaliated on the English in the battle of Bannock-burn, where two hundred thousand English were defeated by thirty thousand Scots. But Robert was not contented with asserting the liberty of his country. Jealous of his brother Edward, he sent him with an army to conquer Ireland. We shall not doubt of his valour, or of the miseries he inflicted, or was willing to inflict, upon the people among whom he came. In destroying them he destroyed his own army. They were reduced to the most dreadful straits by famine, insomuch that they were obliged to feed upon the most loathsome matters, their own excrements not excepted.

Being now arrived at the beginning of the fourteenth century, we see that, from Ireland to China, mankind had involved themselves in one general work of destruction. Besides the wars, famines had been so frequent, that the eating of one another seemed to be but a common affair. Indeed the history of mankind would tempt one to believe that they thought themselves brought into the world for no other purpose but to destroy each other. As far back as the year 409, in the time of the wars of the Vandals in Spain, a dreadful famine took place, which, in 410, reduced many to the necessity of feeding upon human flesh; parents devoured their children, and the wild beasts, being deprived of the dead bodies which they used to feed upon, but which were at this time devoured by the living, fell upon the latter, and thus increased the general destruction. Such of the Romans as fled into strong holds and fortresses, were in the end obliged to feed upon one another. To these calamities the pestilence was added, which did not fail to rage in its usual manner. Famine and pestilence had also ravaged the city of Rome when besieged by the Goths under Vitiges, and under Totila. In this last siege the unhappy citizens were reduced to such straits, that they consumed even the grass which grew near the walls, and were at last obliged to feed on their own excrements. We do not indeed hear, at this time, of any particular instances of people feeding upon one another; though,

though, in such dreadful emergencies, it is scarcely to be doubted that some would have recourse to this terrible expedient in order to allay their hunger. But in the famines which took place during the ravages of the Saracens, Turks and Moguls, nothing seems to have been more common. In 1066 a most grievous famine took place at Alexandria in Egypt, and throughout the whole country. Three bushels and a half of flour were sold at eighty dinars, a dog at five, and a cat at three. The Visir, having waited on the Khalif, left his horse at the palace gate; but, before he returned, the animal had been carried off and eaten. Three men were hanged for this theft, and their bodies ordered to be exposed upon gibbets; but next day they were found picked to the bones, their flesh having been all cut off and devoured the preceding night. Bodies of men and women were boiled, and their flesh publicly sold. A violent plague followed, which swept away the greatest part of the inhabitants. As the hellish Moguls spread desolation wherever they advanced, so their retreats were equally formidable. In 1243, having advanced as far as Aleppo in Syria, they found themselves obliged to retreat, and that for a very odd reason, viz. that their horses were not well shod. This, however, did not hinder them from destroying every thing the earth produced, and stripping every man, nay, every woman, they met, even of their clothes. The consequence was, a terrible famine, so that people were fain to sell their children for small pieces of bread.

Such was the conduct of men, from one end of the earth to the other, during the interval, if any interval there was, between the plague in the time of Justinian and that of 1346. The pestilence, which had continually raged in one place or other, now overspread the whole world. At what time it began to decline we know not; and, indeed, as the same desolations and massacres continued, if these had any share in its production, it ought scarcely to have declined at all. That there was all this time little or no interval, appears from what Dr. Rush says, vol. iii. p. 165, that between the
years

years 1006 and 1680, that is, in a period of 674 years, the plague was *fifty-two* times epidemic all over Europe. Supposing the intervals between every general infection then to have been equal, and the plague to have lasted only one year at a time, it must have recurred once in twelve years. But the intervals were not equal; for the Doctor tells us that it prevailed *fourteen* times in the fourteenth century; which gives an interval of less than seven years; and if the pestilence so frequently overspread the whole continent, we may be very sure that it never was out of particular places of it. The Doctor adds, "The state of Europe in this long period is well known." We shall also consider that of Asia.

The empire of the Moguls, which had fallen into decay, revived under Tamerlane; who, following the example of Jenghiz Khan, had the epithet of the *destroying prince* bestowed upon him by the Indians, on account of his behaviour in their country. Building his captives into walls with stones and lime, pounding them by thousands in large mortars, was his common practice; while the Turks, proceeding westward, wasted every thing with fire and sword; the christians all the while continuing their mad crusades, and when driven from one place endeavouring to establish themselves in another. At last the Turks and Tartars, or Moguls, or rather their emperors, happening to quarrel, the battle of Angora, in Galatia, decided (at the expense of some hundred thousand lives) the dispute in favour of Tamerlane; but, as his empire ended with his life, the Turks soon recovered from the blow they had received; and, by the taking of Constantinople in 1453, put an end to the terrible commotions which had prevailed in the east for so many ages. The crusades had also for some time been discontinued, and the world hath since that time been comparatively in a state of peace.

But, by so much intercourse with the Asiatics, especially with the countries particularly subject to the plague, all Europe had been so deeply infected, that the distemper could not but prevail for a long time, even though it had not been kept up by the almost continual

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wars of the Europeans with one another, which was too much the case. Dr. Sydenham informs us that before his time the plague commonly visited England once in forty years; but by this we must understand a very violent infection; for Dr. Rush tells us that plagues prevailed in London *every year* from 1593 to 1611, and from 1636 to 1649. The author of the *Journal of the Plague Year* (1665) mentions a visitation in 1656; and Mr. Carey, in the beginning of his account of the plague of London in 1665, says, that the plague was *almost continually* among the diseases enumerated in their bills of mortality; so that we may fairly conclude it to have been *endemic* in that city. Now let us see how England had employed itself. Its kings, as well as many of their subjects, had gone to the holy wars, as they called them, and, by continuing in that devoted country where most probably the pestilence first originated, it is impossible to suppose that some of them did not receive the contagion. Having caught the pestilence in the *holy war*, they came home to diffuse it among their countrymen, and to keep it up by *profane wars*, I suppose, both foreign and domestic. Henry VII put an end to a very long and bloody contest between the houses of York and Lancaster; but he brought the pestilence along with him, which raged violently during the fifteenth and sixteenth centuries. A most violent war, for half a century, on the continent of Europe, and civil wars in England, would still continue to keep the infection alive from 1600 to 1648, when a general peace was concluded; and from the subsequent state of tranquillity, probably, after the violent attack in 1665, it seems to have languished and died in England, as a plant in a soil not natural to it.

But, though England has since remained in peace, on the continent it has been otherwise. In the beginning of the eighteenth century, the heroic madness of Charles XII seemed ready to confound the north, while the glorious exploits of prince Eugene and the duke of Marlborough appeared equally confounding to France. In the midst of these grand achievements, the pestilence
silently

silently claimed its share in the common work of destruction; carrying off upwards of two thousand in a week for some time, in 1709, in the city of Dantzick, and, in 1711, twenty-five out of sixty thousand inhabitants in Copenhagen.

The infection, however, seemed now to be retiring to the place from whence it originally came. In 1666, or soon after, it seems to have totally abandoned the island of Britain; with the attack in 1711 it left the western countries of the continent next to that island; in 1713, 1714 and 1715 we are informed by baron Van Swieten that it ravaged Austria; in 1721, or soon after, it abandoned France; in 1743 it made its last attack on Messina; and in 1784 we find it confined to Dalmatia and the eastern territories, where it has so long reigned without interruption.

From the view then which we have taken of the conduct of the human race, and the consequences of that conduct, we may reasonably conclude, that war will produce famine and pestilence, and that after all violent wars a violent pestilence may be expected, especially if the contending parties interfere with those nations where it is most frequent. Another piece of conduct by which mankind expose themselves to pestilential contagions is, the practice of cooping themselves up in great cities. Mr. Gibbon, speaking of earthquakes, says, that men, though always complaining, frequently bring mischief upon themselves. “ The institution of great cities (adds he) which enclose a nation within the limits
“ of a wall, almost realises the wish of Caligula, that the
“ Roman people had but one neck. In these disasters (earthquakes) the architect becomes the enemy
“ of mankind. The hut of a savage, or the tent of an
“ Arab, is thrown down without injury to the inhabitant; and the Peruvians had reason to deride the
“ folly of the Spanish conquerors, who with so much
“ cost and care erected their own sepulchres. The rich
“ marbles of a palace are dashed on his own head, a
“ whole people is buried under the ruins of public or
“ private edifices, and the conflagration is kindled and
“ propagated

“propagated by innumerable fires necessary for the
“subsistence and manufactures of a great city.” In
plagues, great cities are unquestionably as pernicious as
in earthquakes; not indeed by reason of the weight and
bulk of the materials, but the confinement of the peo-
ple within the sphere of infection, and their continual
exposure to the causes which prepare the body for re-
ceiving it. In fact, it has always been found that
plagues begin in cities; and were it not for the multi-
tudes that continually fly out of them there can be no
doubt that the mortality would be much greater than it
is. The intercourse of many nations with one another,
the carrying from one end of the earth to the other of
goods capable of bringing with them the infection, must
also be supposed a very principal cause of pestilence;
but this last will be more fully considered in the next
section. At present we may conclude, that, the pesti-
lential contagion having originally fallen upon mankind
for their sins, it is still kept alive by the same causes;
and, as far as we can conjecture, these sins are, the pro-
pensity to murder and destroy which breaks forth in
war; the vanity, pride and luxury which produces great
cities; and the same vanity, &c. joined with avarice,
which gives life to commerce. Add to all this the neg-
lect of the cultivation of the earth, which ought to be
the principal business of man. In consequence of this
neglect, immense tracts of it are still overrun with
woods, covered with stagnant and noxious waters, or
lying in waste and now uninhabitable deserts, fit only
for serpents and the most destructive animals. Thus the
very climate is changed from what it ought to be; the
elements become hostile to man in an extreme degree,
and the whole system of nature, originally designed to
give life and happiness to the human race, is, through
their own misconduct, changed into a system of misery,
disease and death.

The account just now given of the ways in which
mankind bring upon themselves the plague, and other
diseases almost equally terrible, is so conformable to the
opinions of the learned Dr. Mead, that I shall conclude
this

this section with a few extracts from his works. Of the small pox he says, that he supposes this “ to be a plague
“ of its own kind, originally bred in Africa, and more
“ especially in Ethiopia, as the heat is excessive there ;
“ and thence, like the true plague, was brought into
“ Arabia and Egypt, after the manner above men-
“ tioned” (i. e. by war and merchandise.) “ Now (adds
“ he) if any one should wonder why this contagion was
“ so long confined to its native soil, without spreading
“ into distant countries, I pray him to consider, that
“ foreign commerce was much more sparingly carried on
“ in ancient times than in our days, especially between
“ Mediterranean nations ; and likewise that the ancients
“ seldom or never undertook long voyages by sea, as we
“ do. And Ludolfus observes, that the Ethiopians in
“ particular were ignorant of mercantile affairs. There-
“ fore when in process of time the mutual intercourse of
“ different nations became more frequent by wars, trade
“ and other causes, this contagious disease was spread
“ far and wide. But, towards the end of the eleventh
“ century, and beginning of the twelfth, it gained vast
“ ground by means of the wars waged by a confederacy
“ of christian powers against the Saracens, for the re-
“ covery of the Holy Land ; this being the only visible
“ recompense of their religious expeditions, which they
“ brought back to their respective countries.” Of the
true plague he says, “ It appears, I think, very plainly,
“ that the plague is a real poison, which, being bred in
“ the southern parts of the world, is carried by com-
“ merce into other parts of the world, particularly into
“ Turkey, where it maintains itself by a kind of circu-
“ lation from persons to goods ; which is chiefly owing
“ to the negligence of the people there, who are stupid-
“ ly careless in the affair : that, when the constitution
“ of the air happens to favour infection, it rages there
“ with great violence ; that at that time, more especially,
“ diseased persons give it to one another, and from them
“ contagious matter is lodged in goods of a soft, loose
“ texture, which, being packed up and carried into other
“ countries, let out, when opened, the imprisoned seeds
“ of

“ of the contagion, and produce the disease whenever the
 “ air is disposed to give them force ; otherwise they may
 “ be dissipated without any considerable ill effects. The
 “ air of our climate is so far from being ever the original
 “ of the true plague, that most probably it never produces
 “ those milder infectious distempers, the small pox and
 “ measles. For these diseases were not heard of in
 “ Europe before the Moors had entered Spain ; and, as
 “ already observed, they were afterwards propagated and
 “ spread through all nations, chiefly by means of the
 “ wars with the Saracens. The sweating sickness was
 “ most probably of foreign original. It began in the
 “ army with which king Henry VII came from France,
 “ and landed in Wales ; and it has been supposed by
 “ some to have been brought from the famous siege of
 “ Rhodès, three or four years before, as may be collected
 “ from one place of what Dr. Keyes says in his treatise
 “ on the disease. We had here the same kind of fever
 “ in 1713, about the month of September, which was
 “ called the *Dunkirk fever*, as being brought by our
 “ soldiers from that place. This, probably, had its origi-
 “ nal from the plague which broke out at Dantzick a
 “ few years before, and continued some time among the
 “ cities of the north.”

I now take leave, for the present, of this subject,
 which exhibits the conduct of mankind in such a dis-
 agreeable view. Some, like M. Millot above quoted,
 may be apt to suppose that many of the accounts are
 exaggerated. But it is evident, that in our days it is
 impossible to determine any thing to be a falsehood, said
 to have happened in former ages, which is not absolutely
 contradictory to reason. Every one of the accounts in-
 serted in this section has found a place in the works of
 historians reckoned authentic, particularly in the Uni-
 versal History. All who believe the New Testament
 must certainly believe, from the words of our Saviour,
 that extraordinary things were to happen in the ages
 subsequent to his appearance. Can we then discredit
 the relations of those historians who inform us that ex-
 traordinary things have happened ? Modern historians,

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making their own judgments the infallible measure of wisdom, and the strength of nations now existing the ultimate measure of human power, have endeavoured to turn into ridicule every thing which does not precisely accord with these two. In this the French are particularly culpable ; accounting every thing to be incredible which exceeds the power of modern France to accomplish, though they certainly do not know even the extent of this power. Of such scandalous vanity we have a notable instance in the works of president Goguet, who positively determines that the walls of ancient Babylon, the pyramids of Egypt, and all the wonderful works of Semiramis, Nebuchadnezzar, &c. were not equal to the canal of Languedoc made by Louis XIV !

SECTION III.

Of Disease in general.—The nature of the Plague as a Disease considered.—Of Contagion.—Whether the Plague is really Contagious or not.—Medical History of the Distemper.—Inquiry into its Immediate Causes, and whether an approaching Plague is indicated by any visible Signs.

HITHERTO we have considered the origin of the plague entirely in a moral point of view. We have seen, that, in conformity to the general opinion of mankind, it may reasonably be supposed to have been inflicted upon mankind, the Jews particularly, for their transgressions ; that, having been once introduced, it has been perpetuated, and spread from nation to nation, and that in proportion to the degree of immorality of a certain kind prevailing through the world. From this it is naturally to be inferred, that, were the human race to live at peace with one another, to disperse themselves over the face of the earth for the purpose of improving it by cultivation, and were they to be contented with what the produce of each country affords, there would be no plague among them. But we know that

that such a reformation is not to be expected, and we must take the world as we find it. The question then is, By what means shall individuals secure themselves from being destroyed by a plague which shall happen to invade any country; or how shall a person, already infected with it, be restored to health? For this purpose let us begin with considering the nature of disease in general, and of the plague particularly.

As to disease in general, physicians have differed very considerably in their definitions; and, though many have been given, few seem to be unexceptionable. that of Dr. Fordyce seems to be among the clearest and most expressive. "Disease (says he) is such an alteration in the chemical properties of the fluids or solids, or of their organization, or of the action of the moving powers, as produces an inability or difficulty of performing the functions of the whole or any part of the system, or pain, or preternatural evacuation." But as this definition, however just, cannot be easily understood by such as are unaccustomed to medical language, I shall attempt the following explanation of the animal economy, and the diseases to which it is subject.

1. By nature our bodies are formed of certain solid and fluid parts, operating upon one another in a manner of which we know but little. Anatomists have described the structure of the human body and its parts in a certain degree, but have always found themselves lost in an inconceivable minuteness of texture. The whole structure of the human body, visible and invisible, is called its ORGANIZATION.

2. This organized body is acted upon by certain powers residing in the atmosphere, by which it becomes endowed with LIFE.

3. The operation of those powers upon a well organized body constitutes that agreeable and vigorous state which we call HEALTH.

4. The operation of any other power, substituted in place of the natural one, even upon a body perfectly organized, produces a state very different from health; commonly,

commonly attended with some uneasy sensations, and which is called DISEASE. I say it is *commonly* attended with uneasiness, but not always; for many persons within a few hours, nay, a few minutes, of their death, have imagined themselves quite recovered and well. To illustrate the meaning of what is said of the substitution of any power instead of the natural one: It is natural for man to breathe air of a certain quality; and while he does so he continues in health; but let him breathe the vapour of burning charcoal, or of fermenting liquor, mixed in considerable quantity with the air to which he has been accustomed, and he will very soon find himself diseased. Many other kinds of elastic fluids may be substituted instead of the vapour just mentioned, all of which will in a short time produce a disease in the most healthy man. The state of a diseased body being very different from that of a sound one, the appearances are consequently very different. The various appearances of disease in the human body are called *symptoms* of that disease, from a Greek word signifying *appearance*.*

5. A disease proves mortal only by the DISORGANIZATION of the body. By disorganization I mean any considerable alteration in the structure of the body, visible or invisible. The truth of this will appear from a consideration of the method by which animals may be recovered, after being to appearance dead by breathing the vapour of charcoal, or fixed air in any other form, viz. by plunging them in cold water. In a cave in Italy a continual stream of this kind of air issues from the ground. It rises but a small way, so that a man may safely enter, because his head is above the vapour; but, if he brings a small dog with him, the animal, in consequence of breathing the pernicious fluid, falls down as if dead, and would very soon die if left there. By throwing it into a lake in the neighbourhood, (cold water of any kind would answer as well) it recovers. In the

* "*Symptom* (says Dr. Fordyce) is the Greek name for *appearance*:" but, from the strict etymology of the word, it ought rather to be translated *accident*. The universal consent of physicians, however, has applied it to every appearance produced in the human body by any distemper whatever.

the dissection of some unfortunate people, who have been killed by breathing this pernicious fume, a manifest disorganization has been observed, viz. a rarefaction of the blood, and too great dilation, or even rupture, of the small vessels.

6. A disease cannot always be cured by removing the cause which brought it on : it is necessary also to repair the injury done to the organization. This is exemplified in the case of the dog just mentioned. Taking him out of the vapour is not sufficient for his recovery, because the organization of the body is injured ; the cold water by contracting the vessels repairs the injury, and the cure is completed. To the entire preservation of this organization it is probably owing, that people have frequently recovered after being thought dead for a long time.*

7. When

* Dr. Anthony Fothergill, in his prize dissertation upon the suspension of vital action, quotes some experiments of Dr. Kite, in which he was able to restore to life animals that had been immersed in water for eight, ten or twelve minutes, though he acknowledges that this operation, though performed with great attention, often failed ; while other animals, that had been longer immersed, recovered spontaneously. He further adds, that if it be not attempted before the convulsions of the animal cease, which on an average of many experiments happens in about eleven minutes and a half, it will not be sufficient to renew the vital motions. But, "among the human species" (says Dr. Fothergill) there are not wanting well authenticated instances of "spontaneous recovery at an incomparably longer interval, and after every external mark of life had disappeared. Such is the latent energy of the heart, "that it sometimes, after remaining several hours quiescent, renews on a sudden "the secret springs of life, surmounts the barriers of the resisting blood, and "restores circulation with all the other functions. Hence the unexpected recoveries from death-like syncope brought on by sudden terror, or great effusions of blood, even after the funeral obsequies have been prepared. Hence "some persons have accidentally been brought to life, even after interment, by "the rude motion produced in sacrilegious attempts to wrest rings or bracelets from the apparently dead body."

Several surprising instances of the recovery of persons supposed to be dead, even of the plague, are given by Fabricius Hildanus ; to one of which Dr. Fothergill seems to allude in the above quotation. Hildanus relates, that in the year 1357, when the plague raged violently at Cologne, a certain noble lady, by name *Reichmuth Adoleb*, being seized with the disease, was thought to have died, and was buried accordingly. Her husband, out of affection, would not take off her wedding ring, which she happened to have on her finger. The undertakers being acquainted with this circumstance, next night came to the church where she was buried, opened the sepulchre, and prepared to take off the ring ; when to their utter astonishment she began to raise herself up in the coffin. Struck with consternation they fled in the utmost haste, leaving to the fortunate lady the lanthorn with which they lighted themselves to the church, and by means of which she now found out where she was, and after being come to herself, returned to her own house. Here being known by her voice, and the ring she wore, she found admittance, and by means of a generous diet gradually regained her health ; bringing her husband afterwards three children, and surviving the accident many years.

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7. When the organization of the body is injured, the action of the natural powers themselves occasions uneasiness, and increases the disease. The cure then is, to substitute instead of the natural power, as far as possible, the action of some other power till the organization is restored; after which the natural power must be again allowed to act, or a disease of another kind will take place. This may be exemplified in a consumption of the lungs; where, that part being very much disorganized, pure air renders the disease worse; and the sick are relieved by mixing with the common atmosphere such kinds of air or vapour as would prove pernicious to people in health. But, supposing this method to be successful, and the consumption to be entirely removed, it is plain that the use of the pure atmosphere must be resumed, or the impure air would bring on a disease in the same manner as on a healthy person.

8. The body is wasted in the natural operations of life; part of it passing off with the vapour of the breath, part by insensible perspiration, &c. Hence it naturally tends to disorganization and death, unless the waste be repaired.

9. This natural waste of the body is repaired, and health kept up, by the food and drink taken into the stomach.

10. Hence

A second instance no less remarkable is of a woman of the name of *Nicolle Lentille*, who, being supposed dead of the plague, had been thrown into a pit with a great number of the bodies of others, dead of the same distemper. After lying there a whole night, she came to herself in the morning, but neither knew at first where she was, nor, when she did, could she find any means of escaping, or extricating herself from the heap of dead bodies with which she was oppressed. Being at a distance from any house, her cries were of no avail, and, in the mean time, having taken no nourishment for four days, she was so tormented with hunger that she eat part of the cloth which covered her face. At last, after remaining twenty-four hours in this dreadful situation, the pit being opened to bury some other person, she exerted her utmost endeavours in calling for assistance, and at last was heard by those who stood round. Being taken up and brought home, she presently recovered, and lived several years after.

A third example is given by our author of one who, being carried to a church to be buried, had his face previously sprinkled with holy water by a priest. But this was no sooner done than he shuddered and opened his eyes in a fright; on which he was carried home, recovered, and lived eight years after. Other examples might be brought, but these are sufficient to show what dreadful accidents may ensue from early burials, and how cautious people ought to be in consigning their friends and relations to the dust from whence they were taken.

10. Hence arises another set of diseases ; for as the reparation of the waste, just mentioned, depends on the proper action of the stomach upon the food, and the assimilation of the latter with the substance of the body, it is plain that this operation depends both on the proper quality of the food, and the sound state of the stomach itself.

11. The body is composed of solids and fluids of different kinds, every one of which is subject to diseases peculiar to itself ; but, by reason of the connexion of the parts of the body with one another, it is impossible that any one can be very much disordered without affecting all the rest. As the bond of connexion, however, is in many cases totally invisible to us, surprising instances frequently occur of one part being affected in consequence of an injury done to another very distant from it. This connexion between all parts of the body is called SYMPATHY. Dr. Gardiner of Edinburgh, in his observations on the animal economy, &c. says, that “ the stomach is the principal seat of many of “ the most remarkable sympathetic affections which “ happen in valetudinary states of the body. Every “ disorder accompanied with severe pain affects the stomach, whilst this viscus affects not only in its diseased state every part of the system, but at other “ times the effects of healthful stimuli applied to it are “ instantly communicated to the rest of the body, as “ when we take food, wine, or medicine.” Dr. Darwin in his *Zoonomia* informs us that the stomach is said to sympathize with almost every part of the body ; but Dr. Moore, in his medical sketches, tells us that the *heart* possesses a greater share of sympathy than any other part in the body, and next to it the stomach.*

12. The

* Dr. Gardiner, in his observations above quoted, gives the following curious anecdote. “ An unmarried lady, of a healthy constitution, has such a “ peculiarity in the structure of her nerves, that, though she can, in general, “ bear strong odours as well as most people, yet she cannot suffer a rose to be in “ her bosom, or to hold it in her hand a few minutes, without becoming “ faint, and having an inclination to vomit. Conserve of roses, rose-water, “ and similar articles made from roses, have more powerful effects upon her, “ and usually excite vomiting. Going into a room where any of her companions are washing with rose-water, never fails to produce this effect ; nor “ does she recover of her indisposition in less than two hours.”

12. The solid parts of the body are the bones, the muscles, brain and nerves; the fluids are, the blood, and others produced from it. The bones are known to every one; the muscles are the fleshy parts throughout the whole body; and the nerves are a kind of cords seemingly originating from the brain, and from thence accompanying the blood vessels through all parts of the body.

13. Much has been disputed about what is to be accounted the primary part of the body, on which all the rest depend; and one class of disputants have arranged themselves on the side of the *blood*, and the other on that of the *nerves*. The dispute is like one about the beginning of a circle. It cannot be decided, because the blood cannot act without nerves, nor the nerves without blood. I speak of the human body, being aware that in some animals the position may be controverted. The following is a concise state of the matter.

14. All the blood in the body passes through the heart; which has four cavities; two called *ventricles*, and two *auricles*. These, from their position in the body, are called the *right* and *left*. The right ventricle communicates with the right auricle, as does also the left ventricle with the left auricle; but there is no communication between the right ventricle and the left, nor between the right auricle and the left. Through these cavities all the blood passes to every part of the body, and returns from every part; but, as in the former case, we are here at a great loss where to begin its motion; for this is precisely to find the beginning of a circle. As we must begin somewhere, however, we shall do so with the right ventricle of the heart. This receives the blood returning from all parts of the body, and propels it into the right ventricle; not the whole quantity at once, for it cannot contain one half of it; but by degrees. The auricle contracts as soon as it is full; and in the time that the auricle fills, the ventricle contracts, so that it may be empty, and ready to receive the blood from the auricle. By the contraction of the right ventricle

tricle the blood is driven into the pulmonary artery, and passes into the lungs. Here the artery branches into an infinite number of small vessels much finer than hairs; and these again, uniting into larger trunks, form at last the pulmonary vein, which brings back the blood to the heart. The pulmonary vein is inserted into the left auricle of the heart, which, as soon as it is filled with blood, contracts, and expels the blood from it into the left ventricle. From the left ventricle issues a large artery called the *aorta*, which by its branches supplies the whole body with the vital fluid. In all parts of the body the arteries divide themselves into innumerable small branches, which terminate in veins equally small as in the lungs; but it has been disputed whether the arteries and veins actually join each other in the form of vessels, or whether the arteries deposit the blood in small cells, from which the veins suck it up. The dispute is of no consequence, nor can it be absolutely decided, on account of the exceeding smallness of the vessels; though the microscopical observations are rather favourable to the opinion of a continuation of vessels. The veins from all parts of the body unite into larger vessels, and these again uniting with one another, form at last one very large vein called the *vena cava*, which opens into the right auricle of the heart, from which the circulation goes on as already described. The two ventricles of the heart, and all the veins throughout the body, are furnished with a kind of valves, which allow the blood to proceed in the way of circulation; but prevent its returning in a contrary direction.

15. The lungs, through which all the blood in the body passes, receive likewise the air which we draw in every time we breathe. They consist of two large bodies called *lobes*; from their situation called the right and left. The air is conveyed into them by the wind-pipe, called also the *trachea*, and the *aspera arteria*. On entering the cavity of the breast, the wind-pipe divides into two large branches called the *bronchiæ*; one of which goes to the right and the other to the left lobe of the lungs. By the further division and subdivision of

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these

these vessels the lungs are filled with an innumerable multitude of little tubes, terminating in exceedingly minute bladders or cells, which are the final receptacles of the air sucked in when we breathe. Each of these cells is surrounded with a kind of network of blood-vessels exceedingly small, and consisting of very thin membranes; so that, in passing through the lungs, the blood is exposed as much as possible to the action of the air.

16. It is a matter of great importance to find out what is the use of this exposure of the blood; and great disputes have taken place concerning it. In former times it was supposed that the blood received from the air a *vital spirit*, without which it would have been totally incapable of performing its offices in the body. Later physiologists endeavoured to explode this notion. Dr. Hales particularly, by shewing that the circulation of the blood through the lungs might be continued by inflating and contracting them alternately by the fumes of burning brimstone, endeavoured to prove that the use of the air was only to give the lungs an opportunity of dilating and contracting alternately, by which means principally he thought the circulation might be carried on. This continued to be the most common hypothesis as late as the time of Dr. Huxham. It was however thought also that by the compression of the air the blood was altered in its texture, its bulk, &c. Accordingly Dr. Huxham tells us in the preface to his treatise on air and epidemic diseases, that “air fit for respiration” ought neither to be too hot, nor very cold; for the “use of the inspired air is to temperate the blood, which” would otherwise grow too hot, and putrefy, as is evident from the experiment of the most excellent Boerhaave made in a hot house; for, if the air is more hot, “or even equally hot, as the blood of any animal, it certainly soon dies.”*

17. The modern discoveries in the composition of air, have tended greatly to elucidate the use of this fluid in the lungs, and its action on the blood in respiration.

Dr.

* This certainly does not hold good if we suppose the heat of the atmosphere to be indicated by a thermometer; for we are assured that animals can live in a heat much superior to that which raises the mercury to 97.

Dr. Priestly first determined it to be what he terms a *phlogistic process*, i. e. a process by which the parts of the blood no longer proper to be retained among the rest, or at least some of them, are carried off. That *something* is carried off either from the lungs themselves, or from the blood circulating through them, is evident; for the air which is taken into the lungs in a dry state, comes out of them extremely moist, and loaded with vapour. An essential change is also made in the nature of the air itself; for it now assumes in a great measure the nature of what has been called fixed air, or the fume of charcoal, or fermenting liquor, and thus becomes unfit for being breathed a second time. This change is made by the addition of some terrestrial substance to the pure atmosphere, which the latter volatilizes and carries along with it.*

18. But, whatever may be *carried off* from the blood, during its passage through the lungs, something is certainly *added* to it, for the blood in the pulmonary artery is of a dark red, but when it has undergone the action of the air in the lungs, and returns by the pulmonary vein, it is then of a bright scarlet, which colour it retains through all the arteries of the body, but loses it on its return through the veins. This scarlet colour is communicated to blood in all cases when exposed to the air; and Dr. Priestley has observed that it is acted upon by the air even through a bladder; much more then must it be so through those very thin membranes which form the coats of the fine pulmonary vessels. What this subtil matter is which the blood receives, shall be afterwards inquired into; at present it is sufficient to take notice that it is absolutely necessary, for the purposes of life, that the blood should pass through the lungs: for, as Dr. Huxham observes, "we see neither
" nutrition, nor the motion of the muscles, performed
by

* The discoveries of modern chemists have determined that the aerial fluid, termed *fixed air* or *carbonic acid*, and which is nearly the same with the vapour arising from fermenting liquor, and is also largely contained in the fume of burning charcoal, is not a simple but a compound substance; one part consisting of the pure part of the atmosphere, or *oxygen*, the other of real charcoal. The proportions, according to M. Chaptal, are 12,0288 parts of charcoal to 56,687 of oxygen.

“ by any blood that hath not passed through the lungs ;
 “ this is observable from the coronary arteries* to the
 “ ultimate ramifications of the aorta.” As the previous
 circulation of the blood through the lungs therefore is
 absolutely necessary to the growth and life of the body,
 and as the blood certainly receives *something* from the
 air, we must account this a proof, and no inconsiderable
 one, that the air contains a *vital spirit*, which it imparts
 to the blood in the lungs. But, before we proceed farther
 on this subject, it is proper to take some notice of

19. *The nerves.* These, which constitute such a remarkable and important part of the human body, are white cords, of a soft pulpy substance, defended by a tough skin which goes along with them as far as they can be traced. All the nerves either originate from the brain, or terminate in it. The former doctrine hath been generally adopted, and in conformity to that doctrine the following account of the nerves is laid down. The brain is enclosed in the cavity of the skull, but not without the intervention of two membranes, called the *dura* and *pia mater*, to prevent injury from the hard bones, as well as for other purposes. The brain is divided into two lobes, the right and left. It is composed of two different kinds of substance, the outermost called the cortical, the innermost the medullary substance ; the latter seems composed of fine fibres. The whole of the medullary part of the brain terminates in a substance called the *cerebellum*, very much resembling the brain, but smaller. The *cerebellum* terminates in another substance resembling the medullary part of the brain, called the *medulla oblongata*. The *cerebellum* lies in the back part of the head, and the *medulla oblongata* under it. The latter terminates in the spinal marrow, extending from the lower and back part of the head to the lower extremity of the back bone, and is enclosed in the hollow of that bone. The nerves proceed from these four substances, viz. the brain, the *cerebellum*, the *medulla oblongata*, and spinal marrow. As they pass to all parts

* The name of the vessels by which the heart itself is supplied with blood. These come from the aorta by the circuitous way of the lungs.

parts of the body they accompany the arteries, dividing with them into innumerable small branches ; but they do not return with the veins ; so that they seem not to contain any fluid which goes and comes, or which circulates like the blood. The nervous fluid, if any such there be, seems to move constantly one way, either to the brain or from it.

20. Hitherto we have noticed only things which are evident to our senses, and which the industry of anatomists has abundantly evinced ; but now our subject renders it necessary to step aside a little into the obscure regions of theory and conjecture. The muscles, as we have formerly said, are the fleshy parts of the body ; and by them all the motions of the body are performed. The flesh is distributed into distinct portions, each of which is enclosed in a membrane belonging to itself. Each of these portions is a muscle, and each muscle has a branch of an artery and the branch of a nerve belonging to it. On both these the action of the muscle depends ; for, if we cut the nerve belonging to a muscle, it immediately loses all power of action ; and if we cut the artery which accompanies the nerve, it does the same. As therefore the blood is found to receive *something* from the air, and as it loses this when passing through the arteries, and as the nerves lose their power when the communication with the blood is cut off, it seems extremely probable, that what is imbibed by the blood in the lungs is taken up by the fine ramifications of the nerves, and is no other than the immediate principle of life and sensation. Thus we will establish a doctrine directly opposite to that commonly received ; for, instead of supposing that the nerves originate from the brain, we are now led to suppose that they terminate in it. Instead of supposing that the sensations originate in the brain, we will be led to suppose that every sensation originates in the organ appointed for that sensation. Thus we are conscious that our *eyes*, not our *brain*, are the parts of our body which immediately perceive the light ; our fingers, or any other parts of the body, *feel* what is applied to them ; and of consequence we have
reason

reason to believe that the *animal spirits, nervous fluid*, or whatever we please to call it, proceed from the surface of the body inwards to the brain, not outwards from the brain to the surface of the body. The brain itself seems to resemble a large collection or reservoir of water, in which the sensations, like so many small streams from every part of the body, unite, and in which our intellectual faculties reside in a manner totally inexplicable by us. Thus far it seemed necessary to theorise, in order to form some idea, however obscured, of the connexion between the nerves and our sensitive and intellectual, or, if we please to call them so, our *spiritual* faculties.

21. In consequence of this very intimate connexion between the blood and nerves, it is easy to see that any injury done to the one may very greatly affect the other ; and that a very slight, nay, to us imperceptible, change in the organization of either, may produce the most grievous, and even incurable disorders throughout the whole body, or in any particular organ. Let us now consider a little farther the blood-vessels.

22. It hath been a question, whether in the structure of these vessels nature hath observed an exact proportion. For instance, if the blood passes by a kind of starts through four cavities, as we are assured that it does, it seems natural to suppose that these four should be exactly equal. This, however, hath been denied ; and some, from its accommodating the human frame to their theory, have fancied that they saw the use of such disproportionate work. Dr. Huxham expresses himself in the following words : “ Nor doth the air only refrigerate the blood, but, by preventing its too great ebullition, and condensing it, hinders it from bursting the vessels. This indeed is of exceeding great importance, if, with the very learned *Helvetius*, we suppose the capacity of the right ventricle of the heart to be greater than that of the left, and that the pulmonary arteries are larger than the correspondent veins ; for it thence follows, that the blood ought to be considerably condensed by the inspired air, that an equal quantity of blood may be received, in one and the same time, by
“ the

" the pulmonary veins and left ventricle of the heart,
 " that is thrown off from the right ventricle, and
 " through the more capacious pulmonary arteries. This
 " indeed many deny, asserting quite the contrary. It is
 " necessary, however, that the aorta should receive as
 " much blood from the left ventricle of the heart, as is
 " thrown off from the right ventricle through the pul-
 " monary artery ; and that in the very same and equal
 " time, or a fatal deluge would soon overwhelm the
 " lungs, because the contraction of each ventricle is
 " made at one and the same time ; we always find
 " therefore the aorta and pulmonary artery, in a natural
 " state, equal on this account ; also the capacity of the
 " ventricles ought to be equal, that they may receive,
 " in one and the same space of time, equal quantities of
 " blood," &c.

If any thing farther is necessary upon this subject, we may still observe, that if the blood were at all condensed by the air, it would be so unequally, because the air is at some times much colder than at others ; and thus the disproportion of the cavities of the heart to one another could not fail of producing the most disagreeable if not fatal effects. We often see what terrible consequences ensue upon the enlargement of any part of an artery near the heart ; and these would, sometimes at least, be felt by every individual.*

It is true, indeed, that this objection will in some degree hold, even though we suppose all the cavities of the heart

* But there is a still more egregious blunder, and this the more surprising as it has been very general among physiologists, viz. that when an artery branches into two the capacity of the branches taken together is greater than that of the trunk. This would make the whole arterial system one continued *aneurism*,* and, instead of promoting the circulation of the blood, would in the most effectual manner prevent it. In what manner an error so extraordinary in its nature could pass the mathematical physicians of the last century, I cannot imagine ; but certain it is, that, in the year 1780 or 1781, the Edinburgh College were schooled on this subject by one of their own students named *John Theodore Vander Kemp*, a Dutchman. This gentleman found, by accurate mensuration, that when an artery divides, if the diameters of the two branches are made the two shorter sides of a right-angled triangle, the diameter of the trunk will be the hypotenuse ; and thus, as the areas of circles are to one another in proportion to the squares of their diameters, the sum of the areas of the two branches will be equal to the area of the trunk. On looking into Blumenbach's physiology, I find the same remark.

* An *aneurism* is a preternatural enlargement of an artery. The blood stagnates in that place, and at length eats through the flesh and skin.

heart to be equal, and the capacities of the blood vessels to be perfectly uniform throughout the whole body. For, if we suppose the blood to be at all condensed in the lungs by the coldness of the atmosphere, it must undoubtedly follow, that while passing from them it occupies less space than before it arrives at them. Hence the pulmonary vein, the left auricle of the heart, the left ventricle, the aorta, and all the rest of the arteries for a considerable way, must be comparatively empty, even though they receive as much fluid as fills the vena cava, right auricle and ventricle of the heart, and pulmonary artery. The equality which ought to prevail in the system, and which indeed cannot be dispensed with, can only take place in those remoter branches of the arteries in which the blood has reassumed its former state of dilation or rarefaction.

23. If we consider this matter attentively, we shall find it not a little mysterious. Every time we breathe out the air we have sucked into our lungs, a considerable quantity of moist vapour is breathed out along with it; but it has been proved by undeniable experiments that the emission of aqueous vapour from any substance cools it in proportion to the quantity of vapour emitted. Every breath we draw, then, cools the lungs, and consequently the blood, to a certain degree, and, as the number of times that we breathe in a day is exceedingly great, the cold produced by the evaporation ought to be in proportion. But we see that, notwithstanding all this cooling, whether we breathe cold air or hot air, the temperature of the body remains still the same. The air then, though constantly carrying off the heat of the body, does not cool it in the least by its action on the lungs. The only possible way of solving this apparent contradiction is, by supposing that the air, when acting upon the blood in the lungs, leaves precisely as much heat as it carries off, and therefore, though we breathe ever so long, we cannot by this means become either hotter or colder.

24. To illustrate this subject, we might now enter into an inquiry concerning the origin and cause of
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animal heat; but this will be touched upon hereafter. We shall here only take notice that the heat of the body is almost universally allowed to proceed from the lungs. It has likewise been demonstrated, that the air does in fact contain an incredible quantity of heat, even when it appears to us to be extremely cold. A certain proportion of this heat is separated from it every time we breathe; and if, either by the mixture of other fluids with the air we breathe, or by any change in the organization of the body itself, a greater or smaller proportion of heat should be communicated to the blood, disease must ensue.

25. To sum up then what has been said concerning the blood and nerves: The whole mass of fluid passes from the right side of the heart to the lungs. In the lungs it receives from the air something* necessary to the functions of life and sensation, and purifies itself from those matters which might prove pernicious. From the lungs it passes to the left side of the heart, and thence through the whole body. In its passage through the body, it is accompanied with nerves, which, taking up from the arterial blood that *vital spirit* received from the air, convey it to all the organs of motion, of sensation, and to the brain, where the whole powers of perception being united form our *intellectual faculties*, and, as far as our senses can perceive, the human spirit itself. The blood, thus deprived of its spirit, is collected from all parts of the body by the veins, and returned to the right side of the heart, from whence it is again sent to the lungs, and the process carried on as before. This hypothesis concerning the peculiar function of the nerves I first inserted in the *ENCYCLOPÆDIA BRITANNICA*, second edition, under the article *BLOOD*, in the year 1778. It has been since continued in the third Scots edition, and from thence into the Irish and American editions.

26. It has already been observed, that the body is subjected to a continual waste. One source of this waste

* It seems now to be proved beyond a doubt that this *something* so long unknown is that fluid called by Dr. Priestley *dephlogisticated air*, and by Lavoisier *oxygen*.

waste is the breath, by which a considerable part passes off in vapour. A great quantity also passes off by the pores of the skin; frequently in a perceptible liquid called *sweat*, but oftener in an invisible vapour from all parts of the body, called *insensible perspiration*. The latter has been thought to be the great source of waste to the human body; and it is certain, that if any person in health be weighed when he rises in the morning, he will be found considerably lighter than when he went to bed. The loss of weight in this case proceeds not only from the pores of the skin, but from the lungs; but though physicians have made a general allowance for both these, I have not heard of any experiment by which we can determine how much passes off by the one, and how much by the other, nor indeed does it appear easy to make such an experiment. Galen plainly overlooks the perspiration from the lungs entirely. "This excrementitious vapour (says he) is expelled through small orifices, which the Greeks call pores, dispersed all over the body, and especially over the skin, partly by sweat, and partly by insensible perspiration, which escapes the sight, and is known to few." Sanctorius, and the succeeding writers, have classed both together indiscriminately; allowing the discharge to be so great, that if eight pounds of aliment be taken in, five of them pass off in this manner. In a system of anatomy, published at Edinburgh in 1791, the author says, that the discharge by the skin "is even much larger than this (the discharge from the lungs we may suppose) since it not only throws off a quantity of the aliment, but likewise what is added to the blood by inhalation, which, entering often in a very considerable quantity, is thus again expelled." The same author likewise says, that the "perspirable matter from the skin is principally water," and that it issues in such quantity as to be seen in subterraneous caverns evidently flying off from the surface of the body like a dense vapour. But other physiologists, particularly Dr. Blumenbach, inform us, that the matter of insensible perspiration is quite similar to the discharge from the lungs, particularly containing

taining a great quantity of fixed air. The same account is given in Chaptal's chemistry, on the authority of Messrs. Milly and Fouquet. This may be looked upon as a valuable discovery, especially in conjunction with that related by Drs. Beddoes and Girtanner, viz. that the flesh of animals contains a quantity of oxygen. Dr. Girtanner obtained a quantity of this air from the raw flesh of animals, and says that it may be repeatedly obtained by exposing the flesh to the atmosphere, and distilling with a heat of 60 or 70 degrees of Reaumur's thermometer (something below that of boiling water.) Hence it is natural to conclude, that, as the discharge from the lungs purifies the blood from its useless parts, so does the insensible discharge from the skin purify the solid parts from those particles which are no longer useful. The probability of this also becomes greater by considering, that in diseases, when the quantity of matter to be thrown off is very great, the skin becomes foul, the teeth furred with black fordes, &c. all which disappear as soon as the quantity of the offensive particles is reduced to its natural standard. As to any considerable quantity of aqueous vapour being discharged this way, unless in case of sweat, it does not seem probable; for in such a case our clothes would always be moist; and in the night time the accumulation of moisture would certainly be perceptible. The sweat is entirely of a different nature from the insensible perspiration, and blood and even *sand* has been known to issue through the skin along with it. (*See the Anatomical System above quoted.*)

27. This very considerable waste of the body is repaired by the aliment taken into the stomach. In the mouth it is mixed with a considerable quantity of the liquid called *saliva*, and in the stomach with another called the *gastric juice*, with which that organ always abounds. From the stomach it passes into the intestines, where it is mixed with other two fluids; one called the *pancreatic juice*, the other the *bile*. This last is of a yellow colour, and is sometimes produced in enormous quantities, insomuch that Dr. Wade, in his account of the fevers in Bengal, mentions some patients who have

waste is the breath, by which a considerable part passes off in vapour. A great quantity also passes off by the pores of the skin; frequently in a perceptible liquid called *sweat*, but oftener in an invisible vapour from all parts of the body, called *insensible perspiration*. The latter has been thought to be the great source of waste to the human body; and it is certain, that if any person in health be weighed when he rises in the morning, he will be found considerably lighter than when he went to bed. The loss of weight in this case proceeds not only from the pores of the skin, but from the lungs; but though physicians have made a general allowance for both these, I have not heard of any experiment by which we can determine how much passes off by the one, and how much by the other, nor indeed does it appear easy to make such an experiment. Galen plainly overlooks the perspiration from the lungs entirely. "This excrementitious vapour (says he) is expelled through small orifices, which the Greeks call pores, dispersed all over the body, and especially over the skin, partly by sweat, and partly by insensible perspiration, which escapes the sight, and is known to few." Sanctorius, and the succeeding writers, have classed both together indiscriminately; allowing the discharge to be so great, that if eight pounds of aliment be taken in, five of them pass off in this manner. In a system of anatomy, published at Edinburgh in 1791, the author says, that the discharge by the skin "is even much larger than this (the discharge from the lungs we may suppose) since it not only throws off a quantity of the aliment, but likewise what is added to the blood by inhalation, which, entering often in a very considerable quantity, is thus again expelled." The same author likewise says, that the "perspirable matter from the skin is principally water," and that it issues in such quantity as to be seen in subterraneous caverns evidently flying off from the surface of the body like a dense vapour. But other physiologists, particularly Dr. Blumenbach, inform us, that the matter of insensible perspiration is quite similar to the discharge from the lungs, particularly containing

taining a great quantity of fixed air. The same account is given in Chaptal's chemistry, on the authority of Messrs. Milly and Fouquet. This may be looked upon as a valuable discovery, especially in conjunction with that related by Drs. Beddoes and Girtanner, viz. that the flesh of animals contains a quantity of oxygen. Dr. Girtanner obtained a quantity of this air from the raw flesh of animals, and says that it may be repeatedly obtained by exposing the flesh to the atmosphere, and distilling with a heat of 60 or 70 degrees of Reaumur's thermometer (something below that of boiling water.) Hence it is natural to conclude, that, as the discharge from the lungs purifies the blood from its useless parts, so does the insensible discharge from the skin purify the solid parts from those particles which are no longer useful. The probability of this also becomes greater by considering, that in diseases, when the quantity of matter to be thrown off is very great, the skin becomes foul, the teeth furred with black sordes, &c. all which disappear as soon as the quantity of the offensive particles is reduced to its natural standard. As to any considerable quantity of aqueous vapour being discharged this way, unless in case of sweat, it does not seem probable; for in such a case our clothes would always be moist; and in the night time the accumulation of moisture would certainly be perceptible. The sweat is entirely of a different nature from the insensible perspiration, and blood and even *sand* has been known to issue through the skin along with it. (*See the Anatomical System above quoted.*)

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have voided by stool half a gallon of bilious matter in one day.

28. In the stomach principally the aliment undergoes a certain change called *digestion*, by which it becomes capable of being converted into the substance of the body. Much has been inquired and disputed, to no purpose, about the nature of this change, and how it is effected. One party has declared for *attrition*; a second for *putrefaction*; a third for *heat*; a fourth have supposed that our meat was digested by *chewing*; as if, like the lobster, people had teeth in their stomach! and, lastly, some learned moderns, after much pains and trouble, have found out that it is digested by *solution*. Dr. Moore has summed up the discoveries concerning digestion in the following words: “The food, being previously
“divided and blended with the saliva and air by masti-
“cation, (chewing) is swallowed, and meets in the sto-
“mach with the gastric juice, whose dissolving power,
“assisted by the natural heat of the place, is the princi-
“pal agent in digestion. The process is completed by
“the pancreatic juice and bile, the nutritious parts of
“the food being by this process converted into chyle
“for the support of the body, and the grosser parts
“thrown out.*

29. The inside of the stomach and intestines are full of the mouths of innumerable small vessels, which continually suck up from the aliment, as it passes downwards, the finer parts, in form of a white liquid, called *chyle*; and from the whiteness of their colour the vessels have the name of *lacteals*, from the Latin word *lac*, milk. After passing through the substance of the stomach and intestines, and running along the membrane called the *mesentery*, to which the intestines are attached, the lacteals unite in a large reservoir called the *thoracic duct*; and this again opens into a large vein on the left side, called the *subclavian*, which conveys the blood from half the upper part of the body; soon after terminating in the vena cava, by which the chyle is conveyed to the heart, thence to the lungs, and so on in the common course

* Moore's Medical Sketches.

course of circulation. The conversion of the chyle into blood is called the process of *sanguification*.

30. The blood, thus formed out of the aliment we swallow, is not one uniform fluid like water, but composed of three distinct substances; one, which gives it the red colour, and seems to be composed of little round globules; another, quite colourless, but of a viscid nature, and which very soon coagulates, called the *lymph*; and a third, of a yellowish colour, and retaining its fluidity much longer, called the *serum*. A remarkable property of this last fluid is, that air can act through it upon the blood; for Dr. Priestly found that a portion of black blood assumed a bright, florid colour from the air, even though covered with serum an inch deep. When blood is drawn, the red globules are detained by the lymph which coagulates, and both together form the red mass called *crassamentum*; the serum remaining fluid, and retaining its name.

31. Besides these fluids, the blood either invisibly contains, or is capable of being converted into, a great many others; for all the fluids in the body are separated from it, and all of them, the bile only excepted, from the arterial blood, before it has lost that portion of its spirit which it imbibes from the air. When a fluid is to be secreted, sometimes it is done only by an infinity of small vessels branching off from the arteries, and depositing the liquids which pass through them in particular places; and such are the fluids which moisten the inside of the body, and which are carried off by the breath, or by sweat. But this separation does not by any means hinder the artery from terminating in its usual way in a vein, for in no case is the whole substance of the blood converted into any other liquid; all of them appear to be contained in it. But the greatest number of fluids are separated by means of certain substances called *glands*. These are small round or oval shaped bodies; each of them enclosed in a membrane or skin which separates it from the other parts, and each furnished with a small tube called the *excretory duct*, through which the liquor separated in the gland passes to its place

place of destination. Each gland has also an artery and nerve, and a vein to bring back the blood after it has parted with the fluid intended to be separated. The bile is separated in the liver from the blood of a large vein called the *vena portarum*, formed by the union of some of the veins of the intestines and mesentery. This vein branches out through the liver like an artery, terminating in other veins, which at last bring back the blood to the heart.

32. As the human body is thus furnished with an apparatus for separating and carrying off, it is also furnished with one for absorbing or taking in. All the inward parts of the body are moist; and the moisture is furnished by the small vessels above described, and which separate part of the lymph from the blood. By such continual separation the cavities of the belly, breast, brain, &c. would soon be filled with liquid, were not some means provided for carrying it off as fast as it is formed. The means in question are a set of small vessels called *lymphatics*. These “arise from the internal
“surface of the breast, belly, and every cavity of the
“body; they also overspread the whole external surface
“of the body, and large lymphatic vessels are usually
“found close to the large blood vessels of the extremi-
“ties, besides those small superficial ones which lie
“above the muscles in the cellular membrane (the fat
“or rather the membrane containing it.) The large
“viscera generally have two sets of lymphatics, one
“lying on the surface of the viscus, and the other
“accompanying the blood vessels belonging to it. The
“faculty of absorption, though refused to the lymphatics,
“was ascribed by many anatomists to common veins,
“and this opinion continued to prevail in some degree,
“until Hunter and Monro totally overturned it,
“exploding at the same time the notion that any of the
“lymphatics are continuations of arteries, and establish-
“ing, beyond a doubt, that all are absorbent vessels.”*
All the lymphatics terminate in the thoracic duct; so
that the liquid separated by the *exhalant arteries* (so the
vessels

* Moore's Medical Sketches.

vessels are termed by which that fluid is separated) is again mixed with the blood, and again performs the same offices.

We have now taken a review of the several parts of the human body, slight and superficial indeed, but such as the limits of this work would allow, and sufficient to furnish to those entirely unacquainted with medical matters some general ideas on the subject. We have seen that the body, in general, consists principally of four great parts, the blood-vessels, the lymphatic vessels, the nerves, and the muscles. Besides these we enumerate the glands and membranes; the former being nearly allied to the blood-vessels, the latter *apparently* to the nerves. The bones, having no concern with our present inquiry, are not taken notice of. The stomach and intestines, being principally composed of muscular fibres, nerves, and blood-vessels, must be considered as belonging to these departments. Each of these large divisions has obtained the name of *system*; and even the subdivision of the blood-vessels into arteries and veins. Thus the arteries of the body, taken collectively, are called the *arterial system*; the veins the *venous system*; the brain and nerves the *nervous system*; the muscles the *muscular system*; the lymphatics the *lymphatic system*; and the glands the *glandular system*; &c. These appellations have been given for the sake of distinctness and perspicuity, but they have had a bad tendency. Insignificant disputes have arisen concerning the superiority of one system to the other, and which is to be accounted the *primum mobile* of the body. By observing also the *general* structure of the body in a more full and ample manner than that of the parts which compose it, physicians have been apt to generalize too much in their theories, and to fancy that from a few obvious laws they might be able to explain the phenomena of disease in almost every possible variety. To illustrate this, let us take the blood for an example. This to sight appears an homogeneous fluid; and Boerhaave and others have ascribed diseases to some defect or bad quality of the blood. But this fluid consists of three parts, each, as far as we can perceive, essentially distinct from the other;

viz.

viz. the lymph, serum, and red globules. As each of these happens to be diseased, the cure must be different ; or if two happen to be diseased, the medicines must still be varied. But, besides these general diseases arising from what, like the blood, is common to the whole body, each component part of the body has an arterial system, a venous system, a nervous and lymphatic system, &c. belonging to itself ; all of which, though dependent on the body at large, have yet laws of their own, in consequence of which any one of them may be considerably diseased without much affecting the general system ; and this constitutes what is called *local* disease. Again : The parts of the body are so connected with one another, that the disease of one may show itself in another ; or it may affect the whole body in such a manner as to produce a general disease ; though Dr. Rush considers this last, at least from injuries of the viscera, as a rare occurrence ;* but we certainly know that general diseases are very often followed by evident diseases of particular organs ; and in these cases it is impossible to say whether the general disease did not begin, though imperceptible to us, in that very organ in which we suppose it to terminate when the local disease was come to such an height as to be evident to our senses. In some cases it is plain that local injuries will bring on most violent diseases of the whole system. Thus a local inflammation of the end of one of the fingers, by physicians called a *paronychia*, has been known to induce a most violent fever, nay, even to occasion death. These violent symptoms end as soon as the suppuration is completed ; so that, were it not for the excessive pain of the inflammation, we might be apt to suppose that the fever terminated in the suppuration, whereas it evidently was occasioned by the local disease, or the tendency of the part to suppurate ; the pain and inflammation being necessary preliminaries. Again : When an intermittent fever is said to terminate, or to be followed, by a hardness of the liver, we do not certainly know whether an original disease of the liver might not have

* Medical Inquiries and Observations, vol. iv, p. 153.

have been the cause of the intermittent. From a consideration of all these things, viz. the extreme diversity of parts which compose the human body, the ultimate invisibility of the structure of each, the incomprehensible manner in which they are united, the equally incomprehensible dependence they have upon one another in some cases, and independence in others, the numerous laws by which they are governed, and which must be very much unknown to us, the invisible and incomprehensible nature of the powers which act upon them, &c. &c. I say, when we consider all these things, the boldest theorist must be humbled when he attempts to account for the phenomena of disease in any one instance. The excessive difficulty in which we are involved is beautifully described by Dr. Ferriar when speaking of hysterics; and obstacles equally insuperable by our theories will undoubtedly be met with in any other distemper. "We are ignorant (says he) by what laws the body possesses a power of representing the most hazardous disorders, without incurring danger; of counterfeiting the greatest derangement in the circulating system, without materially altering its movements; of producing madness, conscious of its extravagances; and of increasing the acuteness of sensation by oppressing the common sensorium. In hysterical affections all these appearances are excited, which are incompatible with the reasonings of every system-maker who has yet endeavoured to explain the inexplicable. Nature, as if in ridicule of the attempts to unmask her, has, in this class of diseases, reconciled contradictions, and realized improbabilities, with a mysterious versatility, which inspires the true philosopher with diffidence, and reduces the systematic to despair."

Notwithstanding all these difficulties, however, physicians have theorised, and that with such animosity, as if all the arcana of nature had been laid open to every professor who thought proper to invent or new-model a system; though the constant succession of theories might certainly have shown them the vanity of such attempts. Some of these we must now consider.

Medical theorists have exerted their greatest abilities in explaining the nature of those general diseases affecting the whole body, denominated *fevers*; and which are likewise called *acute* diseases, from the violence with which they sometimes attack, and the rapidity with which they run through their course. Dr. Fordyce says, that fever will sometimes kill in *five minutes* from the first sensation of uneasiness. Ancient physicians have described a number of fevers, which they supposed to be of different species, and accordingly have distinguished by different names. Modern system-makers have added to the number; so that a bare detail of the names which they have given to their divisions and subdivisions, would constitute a very formidable catalogue; but the latest practitioners are decidedly of opinion that there is but one kind of fever, varying itself according to circumstances. Dr. Rush declares himself of this opinion in the most express and positive terms. “There is (says he) but one fever. However
 “different the predisposing, remote or exciting causes
 “may be, still, I repeat, there can be but one
 “fever. Thus fire is an unit, whether it be pro-
 “duced by friction, percussion, electricity, fermentation,
 “or by a piece of wood or coal in a state of inflam-
 “mation.”*

“I have said that there is but one fever. Of course
 “I do not admit of its artificial division into genera
 “and species; a disease which so frequently changes
 “its form and place, should never have been designated,
 “like plants and animals, by unchangeable characters.
 “ Much mischief has been done by nosological
 “arrangements of diseases. They erect imaginary
 “boundaries between things which are of an homo-
 “geneous nature. They gratify indolence in a
 “physician, by fixing his attention upon the name of a
 “disease, and thereby leading him to neglect the vary-
 “ing state of the system, &c.”†

So much then having been said and written upon the disease in question, one might be apt to suppose that the
 nature

* Vol. iv, p. 133.

† Ibid. p. 149.

nature of fever would have been thoroughly investigated, and its causes explained in the most satisfactory manner, long before this time. Instead of this, however, we find it still like a word which every body uses, and nobody understands. Dr. Fordyce, who has lately written a treatise on the subject, endeavours to prove that there is not any single symptom from the existence of which we can certainly determine the presence of this disease. "Fever (says he) has obtained its name in Greek, Latin, Arabic and Persian, principally from the idea of heat: *pur*, in Greek fire; *febris* in Latin, from *fervere*, to "burn," &c. This idea, he goes on to demonstrate, is erroneous; as the body of a feverish patient frequently sinks the thermometer below the natural standard; while the patient sometimes finds himself cold when the thermometer shows him to be really hot, and hot while the same instrument shows him to be cold. Neither is cold, followed by heat, a certain indication of the presence of fever, as many fevers begin without any previous sensation of cold. Frequency of the pulse also is no certain sign; and having discussed this last symptom he concludes thus. "If we examine the restlessness, anxiety, state of the tongue, head-ach, or any other of the symptoms which often take place in fever, we shall find that they also may be present when there is no fever, and absent in a patient afflicted with this disease; and therefore we cannot allow that there is any pathognomic symptom of fever."* Dr. Rush declines giving any definition of fever;† but, with all due deference to these two very experienced physicians, we must account such extreme scepticism altogether erroneous. If fever cannot be defined, it cannot be described; for a *definition* is no other than a short *description*. If again there be no single symptom by which the presence of fever can be known, it is impossible that there can be any *combination* by which it can be known, any more than we can form an unit by any combination of cyphers. In fact Dr. Fordyce himself is at last obliged to acknowledge

* A *Pathognomic* symptom is one which being present *certainly* indicates the presence of a disease, and being absent, the contrary.

† Vol. iv, p. 123.

ledge that there is a certain symptom with which fever *generally* begins ; and, by his insisting upon it in various parts of the work, we must certainly be induced to suppose that it was by this sign principally that he determined whether his patients had a fever or not. “ The first appearance (says he) which generally takes place is uneasiness and restlessness ; a general uneasiness, the patient feeling himself ill, but incapable of fixing on any particular part of the body. This uneasiness affects the mind at the same time. Perhaps in this case it is the mind that is first affected. . . . Along with this uneasiness there is a restlessness, the patient wishing to change his place or posture frequently ; the mind cannot likewise rest upon one object ; it often wanders from one to another subject. At the same time there is a feeling of weariness which resists the disposition in the patient to change his place and posture, and resists the disposition of the mind to alter the object of its attention, rendering the wish for such changes ineffectual. With these arises an actual inability of exerting the muscular powers, or performing any of the functions of the body ; and also an actual inability of exercising the great faculties of the mind, the powers of perception, memory, arrangement of ideas, and of the judgment, in the same degree that they existed in health. The degree in which these take place is extremely different in the attacks of different fevers ; but these appearances are *very rarely* absent, although indeed they may also happen in other diseases.”

Dr. Rush accounts the lassitude with which fever begins, one of the transient phenomena of it ; and this with other phenomena he calls *symptoms*. Such as are more permanent and fixed, and which by other writers have been reckoned different species, he calls *states* ; and of these he enumerates forty. Such as have any relation to the plague are as follow.

1. The **MALIGNANT** state, known by attacking frequently without a chilly fit, is attended with coma, a depressed, slow or intermitting pulse, and sometimes by a natural temperature or coldness of the skin.

This

This depressed state of fever more frequently when left to itself terminates in petechiæ, buboes, carbuncles, abscesses and mortifications, according as the serum, lymph, or red blood, is effused in the viscera or external parts of the body.

2. The **SYNOCHA**, or common inflammatory state; attacking suddenly with chills, succeeded by a quick, frequent and tense pulse, great heat, thirst, and pains in the bones, joints, breast or sides.

3. The **BILIOUS** state of fever; known by a full, quick and tense pulse, or by a quick, full and round pulse without tension, and by a discharge of green, dark coloured or black bile from the stomach and bowels. This state sometimes assumes the form of an hectic; the patient feels no pain in his head, has a tolerable appetite, and is even able to sit up and do business.

4. The **TYPHUS** state; known by a weak and frequent pulse, a disposition to sleep, a torpor of the alimentary canal, tremors of the hands, a dry tongue, and, in some instances, a diarrhœa. Sometimes it assumes symptoms of synocha on the eleventh, fourteenth, and even twentieth days. The common name of this state is the *nervous fever*.

5. Intermissions, or the **INTERMITTING** and **REMITTING** states, occur most distinctly and universally in those which partake of the bilious diathesis.

6. The **SWEATING** state occurs not only in the plague, but in the yellow fever, small pox, pleurisy, rheumatism, hectic and intermitting states.

7. The **FAINTING** state; occurring in the plague, yellow fever, small pox, and some states of pleurisy.

8. The **BURNING** state. This is attended not only with an intolerable sensation of heat in the bowels, but with a burning sensation excited in those who touch the patient's skin. It occurs mostly in the remitting fevers of Asia.

9. The **CHILLY** state differs from a common chilly fit by continuing four or five days, and to such a degree that the patient frequently cannot bear his arms out of bed. The coldness is most obstinate in the hands and feet.

feet. A coolness only of the skin attends in some cases, which is frequently mistaken for an absence of fever.

10. The INTESTINAL state; including the cholera morbus, diarrhœa, and cholic.

11, 12, 13, 14, 15. The APOPLECTIC, PHRENETIC, PARALYTIC, LETHARGIC and VERTIGINOUS states.

16. The ERUPTIVE state; including the small pox, measles, and other exanthemata of Dr. Cullen.

17. The HÆMORRHAGIC state; known by fluxes of blood from various parts of the body.

18. The CONVULSIVE or SPASMODIC state. Convulsions are frequently attendant on the malignant state of fever.

19. The CUTANEOUS state; attended with various eruptions on the skin, particularly *petechiæ*.

These include the most remarkable varieties described by physicians as different species. From the subsequent account of the symptoms of the plague, it will appear that this single distemper monopolises, as it were, the symptoms, at least the most dangerous and terrible, belonging to them all. Those nosologists therefore who suppose the states of fever above described to be different species, instead of saying that the plague belongs to one kind of fever, ought to say that it is a complication of a great many different kinds. But here a question arises: Do all the varieties of fever just now described, or do all the other fevers described by different authors, include all the different modes by which the plague makes its attack? If so, then we know that the plague really partakes of the nature of fever, or may be accounted the highest degree of it. This is the opinion of Dr. Rush; for in his 4th vol. p. 153, he considers the different inflammatory states of fever, according to their strength, in the following order. 1. The plague. 2. The yellow fever. 3. The natural small pox. 4. The malignant sore throat, &c. To this I can have but one objection, and to me it appears insuperable; viz. that the plague frequently destroys without any symptom of fever; and, if so, we must certainly account it a distemper of another kind. To decide this matter,

matter, let us compare the symptoms of the most violent fever with what happens in times of violent pestilence. We can scarce imagine a fever more powerful than that which destroys in five minutes, and the following is the description of it from Dr. Fordyce. “When the first attack of fever has been fatal, it has been classed among sudden deaths, and all of these have been very erroneously called apoplexy, or syncope (*fainting*.) When the attack is fatal, it sometimes kills in five minutes, sometimes it requires half an hour, seldom longer than that time. While the patient is yet sensible, violent head-ach with great sense of chilliness takes place, the extremities become very cold, and perfectly insensible; there is great prostration of strength, so that the patient is incapable of supporting himself in an erect posture; he becomes pale, his skin is of a dirty brown, and he is soon insensible to external objects; the eyes are half open, and the cornea somewhat contracted. If the patient goes off very soon, the pulse is diminished, and at last lost, without any frequency taking place; but if it be longer before he dies, the pulse becomes excessively small and frequent; all the appearances of life gradually subside, and the patient is carried off. Of this the author has seen instances, sometimes at the first attack, oftener in the returns of the disease, although very few.”

This no doubt is very terrible, and no plague whatever can exceed it. Indeed, when *death* is the termination, it signifies little what the *disease* is called. But the question is not whether fever or plague is the most dreadful, but whether they are the same. Now, from the above description, it is plain that fever never kills without some warning. In the present instance, head-ach and chilliness give a certain, though short, warning of the ensuing catastrophe; but, in violent plagues, Dr. Sydenham informs us, that people have been suddenly destroyed as if by lightning. Dr. Guthrie assures us that in the last plague at Moscow he has seen soldiers drop down suddenly as if they had been struck by lightning, or by a musket ball; yet some of these recovered
by

by bleeding and proper management ; but it is certainly not unreasonable to suppose that many, who were not thus taken care of, perished. Dr. Hodges speaks of the contagion of the plague in the most energetic terms. He says, " it is so rare, subtil, volatile and fine, that it insinuates into, and resides in, the very pores and interstices of the aerial particles. It is said to be of a poisonous nature also, from its similitude to the nature of a poison, so that they seem to differ in degree only ; for the deadly quality of a pestilence vastly exceeds either the arsenical minerals, the most poisonous animals or insects, or the killing vegetables ; nay, the pestilence seems to be a composition of all the other poisons together, as well as in its fatal efficacies to excel them. . . . The contagion of the plague is more active than lightning, and in the twinkling of an eye carries to a distance putrefaction, mortification and death. As for the manner whereby it kills, its approaches are generally so secret, that persons seized with it seem to be fallen into an ambuscade or a snare, of which there seems to be no suspicion. . . . In the plague of 1665, as in many others, people frequently died without any symptoms of horror, thirst, or concomitant fever. A woman, who was the only one left alive of a family, and in her own opinion in perfect health, perceived upon her breast the pestilential spots, which she looked upon to be the fatal *tokens* ; and in a very short space died, without feeling any other disorder, or forerunner of death. . . . A youth of a good constitution, after he had found himself suddenly marked with the tokens, believed at first that they were not the genuine marks, because he found himself so well ; yet he was dead in less than four hours, as his physician had prognosticated. A fever, however, did for the most part shew itself, and was always of the worst kind. Sometimes it seemed to resemble a quotidian, sometimes a tertian ; there never was a total cessation, but every exacerbation was worse than before." In like manner the author of the *Journal of the Plague Year* informs us that many, supposing

posing themselves, and supposed by others, to be in good health, would suddenly find themselves seized with great sickness, crawl to a bench, and instantly expire. "Many (says Dr. Hodges) in the middle of their employ, with their friends and other engagements, would suddenly fall into profound, and often deadly sleeps."

It is needless to multiply examples: the above are sufficient to show that the plague, when in its most violent state, kills suddenly and imperceptibly, and that like the bite of a vampire,* without producing any sensible disorder. In a state somewhat inferior, it excites the most malignant fevers; in one still inferior it produces fevers of a milder nature, and so on until we find it so mild, that those infected with it are not even confined to their bed. In all this inquiry, however, we find the secrecy and invisibility of the pestilence, so often mentioned in scripture, still confirmed. Other distempers may "waste openly at noon-day," but this always "walks in darkness."

In one of the inferior stages of this distemper the body is affected with those eruptions named buboes and carbuncles. Dr. Patrick Ruffel, in his treatise on the plague at Aleppo, divides the symptoms of the distemper into six classes. In the first there were no eruptions, and all the patients of this class died. In the second, and all the rest, there were buboes and carbuncles. But, in the latter of these especially, it is worthy of remark, that

* The vampire is a kind of bat, of a very large size, met with in some parts of South America and in the East Indies. This vile creature delights in human blood, and often attacks people in the night time in the most insidious manner. A late traveller relates that at Surinam he was bit by one of them, which sucked so much of his blood, that in the morning he found himself exceedingly weak and faint. He felt no pain, nor was sensible of the injury in any other way. The vampire commonly attacks the great toe, making a wound so exceedingly small that the person is not awaked by it; it then sucks till gorged with blood, and, lest the patient should awake, it keeps fanning him all the while with its large wings, the coolness of which, in that hot climate, promotes sleep. In this manner some are said to have been destroyed. Captain Cook relates an humorous anecdote of one of his sailors, who being ashore at New Holland, and having wandered a little way into the woods, returned in a fright, crying out that he had seen *the devil*! Being asked in what shape Satan had appeared, he answered, "He was about the size of a *one gallon keg*, and very like it; and if I had not been *afear'd*, I might have touched him." It was a vampire. The man, notwithstanding his fright, had not exaggerated its magnitude. People, though mistaken and terrified, are not to be disbelieved in every part of their relation.

that they appear neither as a suppuration, nor as a common mortification, but like the eschar formed by a caustic, which can scarcely be cut by a knife. This appearance is not to be met with in any other disease. In many there are mortifications of various parts of the body, but all these are soft, and seemingly corruptions of the flesh. When a person dies of any ordinary distemper, the flesh soon corrupts and dissolves, but there is no example of its turning to a hard eschar like that made by a hot iron, or the caustic with which issues are made. This shews not merely a cessation of life, but the operation of some very active power in the body, like fire, tending to destroy the texture of it entirely, and to reduce it to a cinder. This power seems also to operate internally in the fleshy parts; for when the bodies of those were opened who died with the *tokens*, as they are called by Dr. Hodges, upon them, the mortification was always found much larger inwardly than it appeared to be on the outside. The tokens themselves are by Dr. Hodges called "minute distinct *blasts*," which had their origin from within, and rose up in "little pyramidal protuberances, sometimes as small as "pins' heads, at others as large as a silver penny; having the pestilential poison chiefly collected at their "bases," &c.

That the plague was by the ancients reckoned a disease of a nature different from all others, appears from Galen, as quoted by Deusingius. "What is called the "*pestilence* is most properly remarked by Galen not to "be a *genus* of any known disease. For whatever diseases and symptoms are associated with the plague, "truly and properly so called, the same are wont to be "called *pestilential* diseases; of which indeed there are "an innumerable multitude, and these not always nor "every where the same."*

In like manner Diemerbroeck, as quoted by Allen, gives his opinion, that "The plague is something different


* Non esse certi morbi genus, id quod *pestilens* vocatur, rectissime notatum a Galeno est (3 Epid. comm. 3. t. 20.) quicunque enim morbi ac symptomata consociantur pesti, veræ propriæque dictæ, iidem morbi *pestilentes* appellari consuevere, quorum equidem innumerabilis existit cohors, ac non semper et ubivis eadem. (Deusing. de Peste, Sect. iii.)

“ferent from a fever, and a fever is only a symptom of
 “it, as I have *very often* observed; and therefore some
 “very ill define the plague by a fever, since a fever does
 “not essentially belong to it. . . . A pestilential fe-
 “ver, the *companion of the plague*, is not occasioned by a
 “pestilential venom, but by the mediation of putre-
 “faction; that is, it is not produced because the hu-
 “mours are infected with the pestilent venom, but be-
 “cause the heart, being irritated, overwhelmed and
 “much weakened by the pestilent venom, can neither
 “duly digest and rarefy, nor govern and sufficiently dis-
 “charge the infected humours; which for this reason
 “putrefy and acquire a preternatural heat, and so excite
 “a fever; which by reason of the foresaid secondary
 “cause, is different and distinct from the plague, and a
 “symptom of it. This is confirmed both by the max-
 “ims and authority of the ancients and moderns, as
 “well as by practice, and evident examples.”

Thus it appears, both by fair reasoning by induction
 from facts, and from the authority of the greatest phy-
 sicians, that the plague is certainly a disease by itself,
 and entirely distinct from all others. Hence it follows,
 that, though we could investigate the causes of fever in
 their utmost extent, we might still be ignorant of the
 true plague. That nothing, however, may be omitted,
 let us now consider what physicians have advanced on
 this subject, and what progress they have made in ascer-
 taining the sources from whence so many direful cala-
 mities are derived.

In an inquiry of this kind, or indeed concerning any
 cause whatever, it is plain that the nature of the effect
 must be first understood. Fever then being an *effect*,
 we must begin with investigating its *nature*. But fever
 itself is only manifest by certain changes in the human
 body. Before we can investigate the nature of fever,
 therefore, we must investigate the human body, and
 that in a manner very different from what we did before.
 We must now consider the sources of life; in what
 manner the vital principle acts upon the body, and by
 what means its motions can be disturbed, or how they
 may be rectified when once disordered, &c. &c.

The

The systems of medicine before the time of Boerhaave are now so generally exploded, that it is needless to take any notice of them; and the reputation of Boerhaave himself in this way seems to be almost expiring. His doctrines, nevertheless, merit some attention, because he takes into account a principle overlooked by succeeding theorists, viz. the *cohesion* of the parts of the body. That he did so is evident, from his having written upon the diseases of a *weak and lax* fibre, and the diseases of a *strong and rigid* fibre. In other respects he followed in a great measure the mechanical physicians of the former century. He therefore took but little notice of the nervous system, as being less subject, or indeed to appearance not at all subject, to the known laws of mechanics. The blood was more manageable. The microscopical discoveries of Lewenhoeck furnished an excellent foundation for his system. This celebrated observer had discovered, or fancied he had discovered, that the red part of the blood is composed of globules. Inaccurate indeed these globules must have been, since each of them was composed of six; four touching one another in the middle, with one above, and one below, thus . The serum was said to be composed of single globules, and by this attenuation it was supposed that the fluid, instead of red, appeared of a *yellow* colour. Still, however, this was insufficient. Each of the yellow globules was *discovered* (either by fancied observations or by conjecture, it matters not which) to be composed of six others, which, singly taken, might constitute the lymph or some other fluid; and thus, like the number of the Beast, we might go on by sixes to the end of the chapter, and solve all the phenomena of nature. In justice to the microscopists, however, it must be observed, that some of them have given a much less fanciful account of the structure of the blood than Lewenhoeck. Mr. Hewson found it composed of vesicles, or small bladder-like substances, with a black spot in the middle. These vesicles dissolved in pure water, but kept their original form, which he says was as flat as a shilling, when a small portion of neutral salt was added to the fluid. The solid particles he supposed to be produced by

by the lymphatic system; the black particles by the spleen.

The supposed observations of Lewenhoeck were of considerable use to Boerhaave in the forming of his system of medicine, though they seem not to have accorded very well with his doctrine of *lensor* or viscosity in the blood. But, let this be as it will, having laid it down as the foundation of his theory, that the diseases of the body proceeded from too great a laxity of the fibres, or from too great a rigidity of them, and a great many from this *lensor*, his practice was accordingly directed to such medicines as he imagined would remove these supposed causes of disease. As the *lensor* of the blood was one of his favourite suppositions, he was therefore perpetually at war with this imaginary enemy, and dealt very much in saponaceous medicines with a view to break it down. But here it is evident that this great man was mistaken, even though we should allow the existence of *lensor* as much as he pleased. The viscosity, *lensor*, or any other state of the blood, is an *effect* of something. It is part of that state into which the body is brought by the disease. The efforts of the physician therefore ought to be against that which produces the *lensor*; for, unless this be done, the cause of the disease must perpetually counteract the medicines by producing new *lensor* as fast as they destroy it; and besides, must have greatly the advantage of the physician, by being already in possession of the whole mass of blood, while the medicines can only enter it very gradually, and that by the stomach and lacteals, instead of being instantly mixed with it, and exerting their power immediately upon the fluid itself.

But besides this mistake, which is common to other systems, Boerhaave's *lensor* has been denied, and that upon such strong grounds that it is now universally exploded. Another system quickly succeeded, in which every thing was managed by the nerves. This was introduced by Hoffman, adopted, and perhaps improved, by Dr. Cullen, under whose auspices it acquired such a degree of celebrity, that for a long time it was dangerous

ous to write or speak against it ; and the person who had the audacity to do so underwent a kind of medical proscription from the Edinburgh College and all its students. According to this celebrated theorist, the brain is that part of the body first formed in the embryo ; it may be seen with nerves proceeding from it long before the heart or any blood-vessel belonging to it is visible. Hence we are to conclude that this part is necessary to the existence of every other part of the body, though it doth not appear that they are essentially necessary to its existence. The superiority of the nerves to all other parts being thus established, the Doctor undertook to prove that all other parts of the body were formed from them ; that the body is nourished immediately from them, and in short that the whole body is in such subjection to the nervous system, that, except for the mere purpose of distending the vessels, we can scarcely know for what end the blood exists ; since the nerves can alter its consistence, or that of any of the fluids secreted from it, by a mere affection of that system, without any thing either added to or taken from the vital fluid.

Thus we were compelled to believe that all diseases at their first origin are affections of the nervous system, from whence they are propagated through the whole body. The Cullenian practice in acute diseases, of which the plague is the most violent, was built upon a maxim of Hoffman : “ *Atonia gignit spasmos :*” *Atony produces spasms.* In explaining the nature of typhus fever, therefore, with which he classes the plague, the Doctor supposed that the contagion acted first upon the nervous system, by producing therein a debility. The immediate effect of this debility is a *spasm*, or preternatural contraction of the capillary vessels, or extremely small arteries. Hence the blood finds some difficulty in circulating, and the patient is seized with shivering, and has a sense of cold. When this has continued for some time the system begins to *re-act* against its enemy ; the spasm is resolved, and, the reaction of the system continuing, the action of the heart and arteries is augmented, and the body becomes warmer. Thus

Thus the coldness, shivering, and consequent heat, which constitute the first attack of fever, are very plausibly explained; but in the mode of cure this learned physician fell into the same mistake with Dr. Boerhaave; for though spasm is undoubtedly, even according to himself, an *effect*, he directs his medicines entirely against it, as if it were a *cause*. Thus, forgetting what he had just before advanced, that the spasm is occasioned by debility, he recommended the most debilitating medicines and regimen to cure people already too much debilitated; and to such practice his enemies alledged that many fell victims. The theory and practice, however, still kept its ground; and as great numbers of students were every year bred up in the belief of it at Edinburgh College, who carried the principles of their teacher to all parts of the world, it bade fair for becoming universal. But, in the midst of this eclat, the whole system received such a rude shock from the doctrines of *John Brown*, though at that time not even M. D. as it hath not yet recovered.

Though the author of the new system contended, as much as Dr. Cullen, for the supremacy of the nerves, he did not upon that foundation attempt to establish his practice. He considered the living body as one machine, the *whole* of which might be acted upon, and always was acted upon by certain powers. It possesses a certain inexplicable property called *excitability*, capable of being augmented or diminished. Every power which augments the *excitability* he called a *stimulus*; the opposite would have been a *sedative*; but according to this system there is not any sedative, nor can there be one in nature. The reason is, that excitability itself has no existence but in consequence of the action of certain powers called *stimulants*. The total subduction of these reduces the excitability to nothing; of consequence no power can act against it in a state of non-existence. What other physicians call *sedatives*, therefore, according to the new system, are only weak *stimulants*. The fallacy of such reasoning is obvious; but as it does not affect the practice, we shall not spend any time in considering it further. On

On the principles just now laid down, the Brunonian system divides all diseases to which the human body is liable into two great classes; the one produced by too much excitement, the other by too little. The former contains those diseases by other physicians called inflammatory; the latter such as are called nervous, putrid, or all in which the powers of life are too weak, and require to be supported. This last is supposed to be much more numerous than the former; and in the cure of these it was that the founder of the system appeared to greatest advantage. A most violent altercation took place between Dr. Brown and the Edinburgh College; yet, notwithstanding all the influence of the professors, and their unanimous opposition to the new doctrines, they found themselves ultimately unable to resist a single man unsupported either by wealth or reputation. The plausibility of his system, and its being obvious to every capacity, overcame every obstacle; so that even the practice of the Cullenians themselves underwent considerable alterations. It is not, however, to be denied that the system hath been considerably improved, or at least altered, by some of Dr. Brown's pupils, who have had the advantage of extensive practice, and of visiting many different countries; which the Doctor himself never had. His materia medica was besides exceedingly confined; the only medicines he had any great opinion of, being laudanum and ardent spirits. The Peruvian bark he held in very little estimation, as being a weak stimulus. He seems to have been unacquainted with the virtues of mercury, except in the venereal disease, and most probably would have given laudanum in those cases of fever where mercury is found by others to be so efficacious. But this deficiency hath been abundantly supplied by some of his followers. In a work entitled "The Science of Life," published by Dr. Yates and Mr. M'Lean, practitioners in the East Indies, we find mercury exhibited in prodigious doses. As a specimen we shall select their third case, which was a dysentery. On the first of September the patient took two grains of calomel and as much opium every two hours. This was continued

tinued for two days. On the third, the dose was given every hour; besides which, he had half an ounce of mercurial ointment with a drachm of calomel rubbed into his body. Next day the pills were continued, and the quantity of ointment tripled by thrice rubbing in. This was continued for three days, at which time, an eruption on the skin appearing, it was feared he could not be salivated; this eruption being a sign that no salivation could be produced. The same mode of treatment, however, was persisted in. September 7th the calomel in the pills was augmented to four grains; the warm bath was used, and the ointment continued; but at night twenty grains of calomel and six of opium were given every two hours. At the same time two ounces of ointment, with four of calomel, were ordered to be rubbed in. Next day, though his pulse was almost imperceptible, and his extremities cold, "the medicines were continued as far as circumstances would admit;" with what view it is not said, nor indeed is it easy to be discovered. At one in the morning, however, the patient died; an event not at all surprising. Our authors excuse themselves for this failure by saying that the viscera of the patient were diseased, as was evinced by the impossibility of exciting a salivation; and "that when a patient is evidently incurable by the common practice, it becomes the duty of the practitioner to depart from it."

No doubt we may readily assent to both these assertions; but though a patient be evidently incurable by the common practice, or by any other, there is no necessity for killing him, or for persevering in a course of violent medicines that evidently make him worse. The whole of this case indeed strongly militates against the doctrine of excitement; for if mercury be such a powerful stimulus to the powers of life in general, how comes it to pass that in the present case the unhappy patient, instead of being in the smallest degree excited, was prodigiously debilitated, and that from the very first time of taking the medicines. This will appear from the following table, exhibiting the symptoms of the disease as they kept pace with the medicines taken.

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DAYS

DAYS OF THE
MONTH.

MEDICINES TAKEN.

SYMPTOMS.

August 29
& preceding.

Ordinary doses of mercury and opium.

Pain of bowels, and frequent stools, growing worse.

Sept. 1 & 2.

Opium and mercury, two grains each, every two hours; besides opiate draughts.

Still increasing.

3d

The opium and mercury as before, but now given every hour; half an ounce of mercurial ointment, with 60 grains calomel.

Stools very frequent, with violent pain in the bowels; extreme thirst, tongue furred, and no sleep.

4th

Pills as usual. Ointmt. thrice rubbed in, once with 120 grains of mercury.

Vomiting during the night. Tongue brown and furred.

5th

Medicines as before.

Violent pain in bowels.

6th

Medicines as before.

Extreme pain on pressing the arch of the colon; frequent stools, profuse sweats, great dejection of spirits.

7th

Pills as before, with four grains of calomel. Mercury in the ointment increased to half an ounce. Warm bath. At night an ounce of mercurial ointment, with two ounces calomel.

As yesterday. An eruption on the skin. At night incessant stools, with violent pain in the belly; profuse sweat.

8th Pills,

8th	Pills, ointment & calomel as before. Warm bath thrice. At night two ounces ointment, with four of calomel.	Incessant stools, with violent pain; at night with blood. Extreme debility.
9th	Medicines of the same kind, as many as could be taken.	Stools innumerable; extremities cold, pulse scarce to be felt.
10th		Death at one in the morning.

From a consideration of this patient's symptoms, in comparison with the quantity of mercury taken, it most evidently appears, that it acted in no other way than as an irritating poison; affecting, with extreme violence, the already diseased intestines, and, instead of exciting the vital powers of the whole system, manifestly destroying them. Let it not be imagined, however, that this case is selected from the rest merely because it was fatal, or because it affords an opportunity of finding fault with the practice recommended in the book. It is the only one in which the mercury had a fair trial; and even here it was not very fair, as being conjoined with a great quantity of opium. In the other cases, which terminated favourably, the mercury was overpowered by such horrible doses of opium, that we cannot tell which medicine had the greatest share in the cure; besides, that in other cases the patients were allowed the free use of wine, which we all know to be a powerful stimulant and cordial; but it is not said that the poor man, whose case is above related, had a single drop of wine, or any thing else, except opium, to support him against the action of such a violent medicine.

On this case it is of importance still to remark, that it affords, in the strongest manner, an argument against what our authors say, p. 86, that "mercury acts by supporting the excitement of the whole body, it invigorates each particular part; and thus occasions, to
" a certain

“ a certain extent, the regeneration of those organs “ which may have been injured by disease.” In the instance adduced, there is no evidence of a stimulus upon any other part of the system than the bowels, which were already debilitated or diseased in such a manner that they could not bear it. The system in general, instead of being excited, was sunk and debilitated from the very first moment, until at last the excitement terminated entirely by the patient's death. But further : There is very little probability that mercury or any other medicine whatever can prove a general stimulus, and that for the following reasons.

1. No medicine can assimilate with the substance of the body. Medicines properly so called are here alluded to. Food or drink of any kind taken for the support of the body while in health, however they may act medicinally upon occasions, are excepted.

2. The body is composed of many various substances, each differing in its nature from the other. The nature of the medicine, whatever it may be, is uniform, and cannot act upon substances of different kinds in an uniform manner ; and without this there can neither be an universal stimulant, nor an universal debilitant.

3. All medicines, being incapable of assimilation with the body, must be considered, when taken into it, as foreign matter ; and the introduction of them at any rate is in fact the creating of a disease. This is evident from multitudes of instances where people by quacking with themselves, and taking medicines unnecessarily, have destroyed their health.

4. As every medicine has one peculiar nature, and one mode of action in consequence of that nature, it must, when introduced into the body, where there are fluids of various natures, act upon one of them more than the rest ; and this may be called the *chemical* action of that medicine upon the body.

5. In consequence of the chemical action of the medicine, the mode by which it is expelled out of the body will be different ; for, as all medicines are extraneous substances, they must be sent out of the body as fast

as possible; and it is their action upon one particular part which promotes their expulsion. Thus, if from the nature of the medicine it acts in a certain way upon the stomach and bowels, it will vomit or purge, or perhaps both; and by this action it is expelled from the body, along with whatever other matters happen to be in the stomach or intestines; and thus medicines do good only accidentally; for mere vomiting or purging are most certainly diseases; but where noxious matters exist in the bowels, and do not naturally excite these operations, an emetic or purgative is unquestionably useful. Here the authors of the Science of Life reason differently; and it is worth while to refute their argument, as being the foundation of such *tremendous* practice as nobody of common sense would choose to be the subject of. Of tartar emetic they speak in the following terms. "That tartar emetic is a stimulant of very high power, is evident from the small quantity of it which produces the state of indirect debility that occasions vomiting. It should be given in such a manner as to increase and to support the excitement. But this will be found difficult, as the duration of its action seems to be even shorter than that of opium. If its action does not continue more than a quarter of an hour, might it not be repeated at such short intervals, and the doses so reduced as to allow the establishment of the indirect debility?" This is arguing in a circle. They first suppose that vomiting is occasioned by indirect debility, that is, the weakness produced by an excessive stimulus to the whole system, as in cases of drunkenness; and then, from the existence of vomiting, they prove that a general stimulus had pre-existed. The cases, however, are widely different. In cases of drunkenness, the person feels himself at first exhilarated, alert and active, which shows the existence of a general stimulus. But who has ever found himself exhilarated by taking a dose of tartar emetic? Yet in a general excitement it is absolutely necessary that this exhilaration should take place, because it is an inseparable consequence of an addition of vital power, let it
come

come in what way it will. Thus we know that if a person happens to be much exhausted by fatigue and abstinence, he will be exhilarated and his strength augmented by a single mouthful of meat, as well as by a glass of wine. This shows that both these are general stimulants to the system; but what medicine have we that will produce similar effects? Perhaps opium comes the nearest in the whole materia medica; but the uneasiness it occasions in the stomach manifests a greater action upon it than the other parts; for if the whole body were equally excited, the withdrawing of the stimulus, or its naturally losing its force, could only have the same effect with fasting or fatigue; but the debility of the stomach, the confusion of the head, and other effects which attend a dose of opium, demonstrate that it acts partially. and not equally over the whole body. The Science of Life indeed says that these effects are owing to the improper omission of the medicine, or not repeating the doses in due time. This may be; but no improper exhibition of food, or want of due repetition, will produce such symptoms; which undoubtedly is a proof that food stimulates the system in one way, and opium in another.

6. If any medicine could be found that acted as an universal stimulus or exciter of the whole system, it could not like others be expelled by any particular evacuation; but, by destroying the balance between the force of the acting powers and the subject on which they act, would most certainly kill, unless very powerful means were used to counteract its effect. The only stimulant we are acquainted with which acts equally on the whole system, and which can be readily exhibited as a medicine, is that pure kind of air called by Dr. Priestley *dephlogisticated*, by Scheele *empyrean*, and by the French chemists and their followers *oxygen*. The exciting powers of this air, when breathed instead of the ordinary atmosphere, are astonishing. It not only augments the appetite, but the power of the muscles, and the inclination to use them; so that without any intoxication or delirium the person cannot refrain from action; and
it

it not only exhilarates the spirits in an extraordinary manner, but beautifies the face. Did the cure of diseases therefore, or any set of them, depend on mere excitation, no other medicine but *oxygen* would be necessary. What effects it may have in diseases of debility is not yet ascertained; but to persons in health it certainly proves fatal: their bodies are unable to bear its powerful action, and of consequence they waste, and would die of consumptions, if its effects were not counteracted. Nor is this at all an easy matter; for Dr. Beddoes informs us that, by breathing this air for a short time each day, only for three weeks, he found himself in great danger of a consumption, and was obliged to use much butter and fat meat in his diet, besides giving up the use of the air altogether, in order to get clear of its mischievous effects.

Another mode of stimulating or exciting the whole system is, by putting into it a larger quantity of blood than it naturally contains. This is entirely similar to the breathing of *oxygen*; especially if arterial blood be used, which has already imbibed its spiritous part from the atmosphere. In the last century the transfusion of blood was proposed not only as a mode of curing diseases, but of restoring old people to youth; and Dr. M'Kenzie, in his *Treatise on Health*, quotes from the memoirs of the Academy of Sciences several instances of the blood of brute animals being infused into human veins, without any inconvenience. It seems, however, not only a bold but an unnatural attempt to use the blood of beasts for such a purpose; and, however lavish mankind may be of their blood upon certain occasions, it is to be feared that there are few who would be willing to spare any to relieve another from sickness; but indeed little can be said about the practice; as, on account of some bad consequences, or failures, it was forbidden by the king of France, and by the pope's mandate in Italy, and has now fallen into disuse. In a paragraph at the end of Heister's surgery (4th edition) it is asserted that the transfusion of blood was productive of madness. Dr. Darwin, however, in his *Zoonomia*, still proposes
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the transfusion of blood as a remedy, and even describes a convenient apparatus for performing the operation. In one part of his work he says, "Might not the transfusion of blood, suppose of four ounces daily, from a strong man, or other healthful animal, as a sheep or an ass, be used in the early state of nervous or putrid fevers?" In another place he mentions his having proposed it to a gentleman whose throat was entirely closed up by an incurable swelling, so that he could swallow nothing. This is a disease not very rare, and which always must be fatal; because the patients, though not affected by any sickness, die of hunger; and, to relieve them from this miserable situation, extraordinary attempts are not only allowable but laudable. The Doctor proposed to his patient, "to supply him daily with a few ounces of blood taken from an *ass*, or from the *human animal*, who is *still more patient and tractable*, in the following manner: To fix a silver pipe, about an inch long, to each extremity of a chicken's gut, the part between the two silver ends to be measured by filling it with warm water; to put one end into the person hired for that purpose, so as to receive the blood returning from the extremity; and when the gut was quite full, and the blood running through the other silver end, to introduce that end into the vein of the patient, upwards towards the heart, so as to admit no air along with the blood. And, lastly, to support the gut and silver ends on a water plate filled with water of 98 degrees of heat; and, to measure how many ounces of blood were taken away, to compress the gut from the receiving pipe to the delivering pipe." The gentleman desired a day to consider of this proposal, and then another; after which he totally refused it, saying that he was now too old to have much enjoyment of life, and that, being so far advanced in a journey which he must certainly accomplish sooner or later, he thought it better to proceed than return. The Doctor informs us that he died a few days afterwards, seemingly very easy, and careless about the matter. One experiment of this kind I have been witness to;

to; not indeed on a human creature, but on a calf. This creature received into one of its jugular veins a considerable quantity of blood from the carotid artery of another, nearly of the same age (about a month, or little more.) It was impossible to say any thing about how much was transfused; only the bleeding was continued till the animal which lost the blood began to shew signs of faintness. The artery was then tied up, and the orifice in the jugular vein closed. The calf which had lost the blood appeared very languid and faint, but lived a few days in a drooping state; when it either died of itself, or was killed, as being supposed past recovery. The other, which had received the blood, appeared to be in every respect highly excited. It became playful, even in the room where the operation was performed, its eyes assumed a bright and shining appearance, and its appetite was greatly increased. Thus it continued for about a fortnight; appearing all the time to be in high health, and eating much more than usual; but at last died suddenly in the night. From these effects on healthy subjects, however, we cannot infer what would happen in such as are diseased; but it is plain that if the cure of diseases were to depend upon mere *excitation*, the means are in our power without any local irritation, which always must take place in some degree by the use of ordinary medicines. This path is not absolutely untrodden: the pneumatic practitioners of the present day have tried oxygen consumptions, and found it pernicious; and D M'Kenzie informs us that the transfusion of blood was tried ineffectually in the same.

7. As all the medicines usually prescribed at present are only to be accounted partially stimulant, or as acting upon particular parts of the system, we see that some may promote one evacuation, and some another; while all produce some change in the organization, which may prove useful or detrimental, may increase the disease or cure it, or may produce another, according to the judicious or injudicious application. But for a knowledge of all this we must be indebted to experience: there is not a theory on earth that can lead us a single step.

R

Before

Before we dismiss the consideration of medical theories, however, it will still be necessary to give some account of the new system as it hath branched out in various ways: for though the fundamental principle is now received by a great number of physicians, yet the superstructure is exceedingly different from what Dr. Brown himself erected; and, indeed, from the very same principles we find conclusions made as directly opposite to one another as can be expressed in words. Drs. Yates and M'Lean, for instance, at Calcutta in the East Indies, have concluded that the plague "is a disease of a very high degree of exhaustion;" which Dr. Brown would have called debility. Dr. Rush at Philadelphia, proceeding also upon the Brunonian principles, determines it to be the most inflammatory of all diseases,* and which Dr. Brown would have called a disease of excitement. These two doctrines are, in every sense of the word, as distant from one another as east from west. Let us then consider both, if any consideration can avail us on the subject.

By the ancients it was supposed that diseases were occasioned by something either bred in the body or received into it, and that the power of nature produced, during the course of the disease, a certain change in this matter, called *coction*, or *concoction*; which, if we please, we may express by the English word *cooking*. The matter of the disease, called also *morbific* matter, thus *cooked*, was in a state proper for expulsion, and was therefore thrown out by sweat, vomit, stool, &c. or it might be expelled artificially, which could not have been attempted with safety before. Modern systems deny the existence of morbid matter, and resolve all into an affection of the nerves, according to Dr. Cullen by certain sedative causes, but according to Dr. Brown by an accumulation in some cases, and an exhaustion in others, of the excitability or excitement of the body. The Science of Life commences with stating what they suppose to be an improvement of the Brunonian principles, and from which the following account of the origin

* See above, p. 102.

gin of diseases is extracted. "Upon the different states of
 " *excitability* depend all the phenomena of health and dis-
 " ease. There are three states of the excitability. 1. The
 " state of accumulation; when a portion of the usual
 " stimuli is withheld. . . . When a portion of the
 " usual stimuli is withheld, the excitability accumulates,
 " and the body becomes susceptible of impresson in the
 " direct ratio of the subduction. This state constitutes
 " diseases of accumulation, or of direct debility. 2. The
 " middle state; when the excitability is such that the ap-
 " plication of the accustomed degree of exciting powers
 " produces *tone* or *health*. 3. The state of exhaustion.
 " When the application of stimuli has been greater than
 " that which produces healthy action, the excitability is
 " exhausted, and the body becomes less susceptible of
 " impresson in the direct ratio of the excess. This state
 " constitutes diseases of exhaustion, or of indirect debility.
 " The states of accumulation and exhaustion of the ex-
 " citability, in their different degrees, constitute all the
 " diseases to which living bodies are subject."

Here the chime runs on the word *excitability*, which is not defined. If we call this property *life*, then we are only informed, that, as life is more or less vigorous, the body enjoys a greater or smaller degree of health; which we know without any medical instructor. If, instead of the accumulation and exhaustion of excitability, we take the original doctrine of excitement and debility laid down by Dr. Brown himself, we are nothing better. The whole theory is lost for want of the definition of a single word. As long as *excitability* remains an unknown property, we can explain nothing by it. We may indeed vary our terms. We may call it *nervous influence* with Dr. Cullen, or *sensorial power* with Dr. Darwin; but we shall still be as much in the dark as ever; and all that can be made out of our theories, when our language is *decyphered*, must be, that sometimes people are well, and sometimes they are sick!

Dr. Rush, in his Treatise on the Proximate Cause of Fever, adopts in part Dr. Brown's system pretty nearly as the author himself laid it down. "Fevers of all
 " kinds

“ kinds (says he) are preceded by general debility. This
 “ debility is of two kinds, viz. direct and indirect. The
 “ former depends upon an abstraction of usual and
 “ natural stimuli ; the latter upon an increase of natural,
 “ or upon the action of preternatural, stimuli upon the
 “ body. . . . Debility is always succeeded by increased
 “ excitability, or a greater aptitude to be acted upon by
 “ stimuli. . . . The diminution or abstraction of one
 “ stimulus is always followed by the increased action of
 “ others.” Here it is evident we are as much in want
 of definitions as ever. We know neither what *excitability*
 is, nor what *debility* is, and yet they are both held out
 as the *causes*, and *proximate* or *immediate* causes, too, of
 symptoms produced by things quite obvious to our
 senses. Thus cold and heat, with which we are daily
 conversant, are only called the *predisposing* causes of fever ;
 while *debility* and *excitement*, words to which we have
 no meaning, are said to be the *proximate* cause. It
 would certainly be better to throw away such words al-
 together, and say that cold, heat, &c. cause fevers, with-
 out troubling ourselves farther about the matter.

It remains now to take into consideration the pneu-
 matic theories, founded upon the discoveries made by
 Dr. Black, Dr. Priestley, Lavoisier, and others, concern-
 ing various kinds of aerial fluids, or *gases*,* as they are
 also called. Some of these, particularly that afterwards
 called fixed air, were discovered by Van Helmont.
 Considerable advances were made by a German chemist,
 named *Mayow*, in the last century ; but his book had
 fallen into such oblivion that his name was scarce ever
 mentioned, until his discoveries were repeated, and still
 greater advances made by others. Dr. Hales obtained
 air from a great many different substances, but was un-
 able to ascertain any thing concerning its nature. Dr.
 Black of Edinburgh laid the foundation of pneumatic
 chemistry, by discovering that a certain species of air is
 capable of being absorbed by earths of different kinds,
 and that many very heavy substances owe at least one
 half

* *Gas* is a German word, or derived from one, signifying *spirit*. The
 word *ghost* comes from the same original.

half of their weight to this condensed air. The discovery was accidental. Wishing to obtain a very pure and white lime, he had recourse to the fine white earth called *magnesia alba*. Some of this he distilled with a heat sufficient to make the vessel red hot. Only a very small quantity of water came over, but the magnesia had lost almost two thirds of its weight. This immense loss was found to arise from an emission of air during the operation; and by other experiments it was likewise found that the air might be transferred from one portion of magnesia to another from which it had been previously expelled; that the existence of this species of air in certain bodies was the cause of that fermentation which takes place when any acid is poured upon them, as vinegar upon chalk or potash. Hence if any of these substances be deprived of its air, it will not any longer ferment in this manner. It must not be forgot, however, that when air thus unites itself with any terrestrial substance it no longer has its former properties. It is reduced exceedingly in bulk, and in proportion to this reduction only the body is increased in weight; and therefore though we say that the *air* is absorbed, we must still remember that only *one part* of it is so, and that by far the least considerable in bulk. A violent fire will always expel the air again, and restore it to its former bulk; and again the condensation or absorption of the air is always attended with the production of heat. This last property was not much attended to by Dr. Black, but others have observed it; and the late Dr. Charles Webster of Edinburgh published a theory in which he maintained that condensation was in *all* cases the cause of heat. But, however true it may be that condensation of any kind is followed or accompanied by heat, it is evidently necessary to know the cause of the *condensation* also, otherwise we make no advance in solid theory.

The aerial fluid, discovered by Dr. Black, was one of those most commonly met with. He called it *fixed air*, from its property of adhering or fixing itself to different bodies. It was found to be the same with that which had been discovered by Van Helmont, and by him

him named *gas sylvestre* (spirit of wood)* or the fume of charcoal; it was found to be the same with the steam of fermenting liquor, and with that very frequent and dangerous vapour, met with in coal mines, called in Scotland the *choke-damp*. Like other discoveries, this was quickly pushed beyond its proper bounds, and applied to the solution of phenomena which it could not solve. Dr. M'Bride, particularly, supposed it to be the bond of union between the particles of matter, or in other words the principle of cohesion itself. It was also supposed to be the substance of those scorching winds, called *famiel*, met with in Asia and Africa, and which sometimes prove fatal to travellers. The pernicious vapours called *mofetes*, which sometimes issue from the old lavas of Vesuvius in Italy, were likewise supposed to be the same;† but of this, particularly with regard to the famiel, there seems to be no sufficient evidence. The

* This must be understood only of its general properties and effects; for, though the fume of charcoal possesses many of the apparent properties of pure fixed air, it contains also a very considerable quantity of another kind of gas.

† Many fabulous stories have been related concerning the famiel. Even so late a traveller as Mr. Ives has adopted some of those exaggerated accounts which have been discredited by those who have long resided in the countries where this wind is commonly met with. It is not peculiar to the deserts of Arabia, but is met with in all hot countries which are destitute of water. In the African deserts therefore it is common; and Mr. Bruce describes it by the name of *simoom*. It was preceded by whirlwinds of a very extraordinary kind. "In that vast expanse of desert (says he) from W. and to N. W. of us, we saw a number of prodigious pillars of sand at different distances, at times moving with great celerity, at others walking on with a majestic slowness. At intervals we thought they were coming in a very few minutes to overwhelm us; and small quantities of sand did actually more than once reach us. Again they would retreat so as to be almost out of sight; their tops reaching to the very clouds.* There the tops often separated from the bodies; and these, once disjoined, dispersed in the air, and did not appear more. Sometimes they were broken near the middle, as if struck with a large cannon shot. About noon they began to advance with considerable swiftness upon us, the wind being very strong at north. Eleven of them ranged along side of us at about the distance of three miles. The largest of them appeared to me at that distance to be about ten feet diameter. . . . It was in vain to think of flying; the swiftest horse or the fastest sailing ship could be of no use to carry us out of this danger; and the full persuasion of this rivetted me as if to the spot where I stood." At another time he saw them in much greater number, but of smaller size. They began immediately after sunrise, like a thick wood, and almost darkened the sun. His rays darting through them gave them the appearance of pillars of fire. They now approached to the distance of two miles from our travellers. At another time they appeared beautifully spangled

N. E. In these sandy deserts, where it never rains, there are no clouds.

The industry of other experimenters did not long leave theorists without abundance of materials upon which they might exercise their talents. It is impossible in this place to assign to each his proper rank in the way of discovery, or indeed to mention their names. Dr. Priestley has distinguished himself far above the rest. He not only repeated and improved Dr. Black's experiments on *fixed air*, but likewise found out a number of other kinds; particularly that from animal substances in a state of putrefaction, which is so pernicious to living creatures, insects excepted; for these last will thrive amazingly in air that would prove certain death to a man. He also discovered that this kind of air, and some others, were absorbed by vegetables, and thence inferred the use of vegetables in purifying the atmosphere. He even analysed the atmosphere itself, and found that
it

spangled with stars. In Darwin's Botanic Garden we find a reason assigned for the appearance of these whirlwinds; viz. the impulse of the wind on a long ledge of broken rocks which bound the desert. By these the currents of air which struck their sides were bent, and were thus like eddies in a stream of water which falls against oblique obstacles. In the same work we have the following poetical description of them:

"Now o'er their heads the whizzing whirlwinds breathe,
And the live desert pants and heaves beneath;
Ting'd by the crimson sun, vast columns rise
Of eddying sands, and war amid the skies,
In red arcades the billowy plains surround,
And whirling turrets stalk along the ground."

Whether the simoom is always preceded by these whirlwinds we know not; but Mr. Bruce mentions an extreme redness of the air, pointed out by his attendant Idris, as the sure preface. His advice was, that all of them, upon the approach of the pernicious blast, should fall upon their faces, with their mouths on the earth, and hold their breath as long as possible, so that they might not inhale the deadly vapour. They soon had occasion to follow this advice; for next day Idris called out to them to fall upon their faces, for the simoom was coming. "I saw (says Mr. Bruce) from the S. E. a haze coming, in colour like the purple part of the rainbow, but not so compressed or thick. It did not occupy twenty yards in breadth, and was about twelve feet high from the ground. It was a kind of bluish upon the air, and it moved very rapidly; for I could scarce turn to fall upon the ground, with my face to the northward, when I felt the heat of its current plainly upon my face. We all lay flat on the ground, as if dead, till Idris told us it was blown over. The meteor, or purple haze, which I saw, was indeed passed; but the light air that still blew was of heat sufficient to threaten suffocation. For my part, I felt distinctly in my breast that I had imbibed a part of it: nor was I free of an asthmatic sensation till I had been some months in Italy, at the baths of Poretta, near two years afterwards." It continued to blow for some time, and in such a manner as entirely to exhaust them, though scarcely sufficient to raise a leaf from the ground.

The account given by Mr. Ives is, that it blows over the desert (of Syria) in the months of July and August, from the northwest quarter, and sometimes
continues

it consisted of two different kinds of fluids, one of which he called *dephlogisticated*, the other *phlogisticated* air. The former was found to support animal life for a time, the latter to destroy it instantly. Their effects upon fire were the same; the former exciting the most vehement heat and bright flame, the latter extinguishing a fire at once.

The fame of Dr. Priestley's discoveries quickly reached the continent of Europe; the French chemists repeated his experiments with improvements, as they thought; and indeed certainly made many curious discoveries. Lavoisier was particularly remarkable for his numerous and accurate experiments; but, by his changing entirely the language of former chemists, and substituting a set of new terms of his own invention, he certainly entailed the greatest curse upon the science it ever met with. It belongs not to this treatise to give an account of his system farther than to say, that, from the immense proportion

continues with all its violence to the very gates of Bagdad, but never affects any body within its walls. Some years it does not blow at all, and in others it comes six, eight, or ten times, but seldom continues more than a few minutes at a time. It often passes with the apparent quickness of lightning. The sign of its approach is a thick haze, which appears like a cloud of dust rising out of the horizon, on which they throw themselves with their faces on the ground, as already mentioned. Camels are said, instinctively, to bury their noses in the sand. As for the stories of its dissolving the cohesion of the body in such a manner that a leg or an arm may be pulled away from those who are killed by it, or that their bodies are reduced to a gelatinous substance, we cannot by any means give credit to them. From its extreme quickness, and luminous appearance, it would seem to be an electrical phenomenon immediately preceding those vehement hot winds which all travellers agree in likening to the vapour issuing from a large oven when the bread is newly taken out. Its electrical nature will be more probable from the account given by Mr. Ives, that the Arabians say it always leaves behind it a very sulphureous smell. These particulars do not at all accord with the supposition of its consisting of fixed air. I have indeed been assured by a gentleman long in the service of the English East India Company, that the samiel cannot pass over a river. Hence probably it has been supposed to be a blast of fixed air, because this species of gas is readily absorbed by water; but we know that the same thing would also take place with any quantity of electric matter; for water takes up this also much more completely than it does fixed air.

The *mosetes* are invisible, and kill in an instant. They rise from old volcanic lavas, and, as it were, creep on the ground, and enter into houses, so that they are very dangerous; but, though they may probably consist of fixed air, we have not as yet any direct proof of it. It is not indeed easy to imagine why any lava should suddenly emit a great quantity of fixed air, and then as suddenly cease; nor in what manner the air thus emitted should continue unmixed with the atmosphere; for fixed air will very readily mix in this manner, inasmuch that a large quantity of it being let loose in a room has been found to vanish entirely in less than half an hour. Sir William Hamilton mentions a *mosete* having got into the palace of the king of Naples.

proportion of condensed aerial matter found in most terrestrial substances, he and his followers were led to conclude, that different species of air constitute almost the *whole* of the terraqueous globe. Water particularly they have absolutely and most positively determined to be a composition of two airs condensed, viz. the dephlogisticated and inflammable, which they call *oxygen* and *hydrogen*. However, this doctrine is still opposed by Dr. Priestley and some others.

In the midst of so much theory, and so many new and surprising discoveries, it would have been wonderful indeed if the science of medicine had kept free from innovation. It did not: the new chemistry, with all its formidable apparatus of hard words, was introduced, and thus the study of the science, already very difficult, was rendered still more so. In passing this censure upon the modern *nomenclature*, as it is called, I am sensible that I must rank with the minority; nevertheless, I have the satisfaction of finding that I am not altogether singular. Dr. Ferriar, in the preface to his second volume, complains, "that, with every attempt towards the formation of a system, new applications of words are introduced; which, though desirable in the art of poetry, are very inconvenient in pathological books, especially when this is done to give an air of novelty to old theories and observations. For, between the ancient language, which practitioners cannot entirely reject, and the new dialect, which they cannot wholly adopt, the style of medical books is reduced to a kind of jargon, that the author himself may possibly understand, but which his readers find it very difficult to unriddle. Hence results a neglect of medical literature, and hence the pernicious habit of regarding as new whatever has not appeared in the publications of the last half century." To the same or a similar purpose, in the preface to his first volume, he cites Quintilian. * "Some have such a multitude of vain words, that, while they are afraid of speaking like other people,

by

* Est etiam in quibusdam turba inanium verborum, qui dum communem loquendi morem reformidant, ducti specie nitoris, circumeunt omnia, copiosa loquacitate, quæ dicere volunt.

by a kind of affected elegance, they confound every thing they have to say with their immense loquacity."

The pneumatic system naturally arose from a consideration of the composition of the atmosphere we breathe. Finding this fluid to be composed of two others, the one of which would preserve life for some time at least, and the other instantly destroy it, it became natural to think that diseases might be produced by any considerable variation in the proportion of these ingredients. An instrument was soon invented by which any considerable variation in this respect might be discovered; but upon trial this was found to be of very little use. Dr. Priestley himself tried, by means of this instrument, some very offensive air which had been brought from a manufactory, and could find no remarkable difference between it and that which was accounted pure. Still, however, it was evident that by increasing very much the proportion of one of the ingredients, some considerable alteration might be produced, which could not but be perceptible in the human body; and this led to the application of aerial chemistry to disorders of the lungs. The mixture chosen for this purpose was pure dephlogisticated (*oxygen*) with inflammable air (*hydrogen*;) and, though this has not been known to effect a radical cure, it certainly has given relief in many cases. In fevers also the application of fixed air (carbonic acid) hath been found advantageous; but with regard to oxygen and some others we have not yet a decided instance of their good effects in any case. Dr. Beddoes indeed is of opinion that it would be of service in the sea-scurvy; but in this (whether his conjecture be right or wrong) the theory is certainly erroneous, as shall presently be evinced.

In considering the pneumatic system it is evident that modern chemists have fallen into the same error with their predecessors, viz. of supposing that every thing which by the force of fire or otherwise they could produce, from any substance, previously existed in it. Hence, as from a piece of bone for instance, a chemist can produce water, salt, oil and earth, it was supposed that

that these four were the principles or elements of the bone. But this was false reasoning; for if these were really the chemical principles, they ought to have been able to produce some kind of bony substance by mixing them together after they had been distilled. But no such thing could be done; and though we should add to the mixture the whole quantity of air emitted during the distillation, and which escaped the notice of ancient chemists, our success would be no better. In like manner, because in certain circumstances oxygen is obtained from the flesh of animals, it has been concluded that it necessarily exists as an ingredient in their bodies while living; and that, if this kind of air happens to predominate, the animal will be affected in one way, or if hydrogen prevail, in another. But though we have already quoted Dr. Girtanner with approbation as having obtained oxygen gas from fresh meat, yet this does not by any means prove to us that it exists in flesh as one of its component parts. Even in the Doctor's experiment it was necessary to expose the flesh to the atmosphere in order to procure the gas by distillation; which undoubtedly must excite a strong suspicion that the air in question comes from the atmosphere itself; and, if this is the case, it is not reasonable to suppose that a disease could be cured by any addition of oxygen to the solid parts; because, though sound flesh may have an inclination to absorb this kind of air, we do not know whether it would have such a property of absorption in a diseased state. Indeed in the scurvy, which Dr. Beddoes chooses as an example, experiment seems to determine in favour of *fixed air* rather than any other. But let us hear Dr. Girtanner himself, who has at large discussed this subject in two memoirs; one upon the laws of irritability, and another on the principle of irritability.

In these memoirs we find the Brunonian doctrine set forth with such silence in regard to Dr. Brown himself, that some have not scrupled to charge Dr. Girtanner with literary *theft*; but this is a matter which belongs not to us to consider: the theory may be very good, whether stolen or not. He changes the word *excitability*,

lity, used by Dr. Brown, for *irritability*; but hath the misfortune of not being able to tell us what he means by it. He goes on, however, to distinguish the three states of *tone* or health, *accumulation*, and *exhaustion*, as other Brunonians do. Health, he says, in a fibre “ consists in a certain quantity of the irritable principle necessary for its preservation. To maintain this state, the action of the stimulus must be strong enough to carry off from the fibre the surplus of this irritable principle, which the lungs and the circulation of the fluids are continually supplying. For this a certain equilibrium is necessary between the stimuli applied and the irritability of the fibre, in fine that the sum of all the stimuli acting upon it may be always nearly equal; powerful enough to carry off from the fibre the excess of its irritability, and not so strong as to carry off more than this excess. When the sum of the stimuli acting upon the fibre is not great enough to carry off all its excess of irritability, the irritable principle accumulates in the fibre, and then it is found in that state which I call the *state of accumulation*; the irritable principle accumulates in the fibre, its irritability is augmented, and the stimuli produce much stronger contractions than when the fibre only retains its tone. When the sum of the stimuli acting upon the fibre is too great, the fibre is deprived not only of the excess of its irritability, but also of some portion of the irritable principle necessary for the tone of the fibre; or, more properly speaking, the fibre loses more irritability than it receives, and, of course, in a short time finds itself in a state of *exhaustion*; and this exhaustion will be either *temporary*, or *irreparable*.”

Here it is evident that we have nothing but Dr. Brown's system, without the least explanation to render it more intelligible. A definition is still wanting. This invisible and incomprehensible property of *irritability* ruins our whole fabric; nor can the deficiency be supplied by human art or skill; of consequence we must abandon this part of the system entirely, and come to something

something more cognizable by our senses. It is impossible, however, to pass over in silence the amazing inattention of the author, in imagining that on such unintelligible principles he could explain other phenomena. "In the state of *temporary exhaustion* (says he) the fibre loses its tone, and fails for want of irritability. The application of a stimulus while it is in this state will not make it contract. Provided the stimulus be not very strong, it will produce no effect at all, but in a short time the irritable principle will accumulate afresh in the fibre, and then it will again contract. It is only by little and little that the fibre recovers its irritability. This truth, I dare venture to say, is as new as it is striking. It unfolds a vast number of phenomena hitherto inexplicable." Here we have nothing but the pompous declaration of a fact already well known; viz. that not only a *fibre*, but the whole body, may be in a state of temporary insensibility, and yet recover either of itself or by the use of external means. How many people have fallen into a *syncope*, and yet recovered! How many limbs have become paralytic, and in time recovered their sense and motion! Yet this is all that we are informed of with so much parade and assumption of novelty. We know that when a person is in a faint he is insensible to ordinary stimuli, though very strong ones will rouse him; but what can we infer from this? Nothing: only we see it is so. Does it avail us any thing to be told that during the time of fainting the *irritability* is exhausted, and "in a short time the irritable principle will accumulate afresh;" in which case the patient will no doubt recover, unless he happens to be dead, which is the true meaning of an *irreparable exhaustion* of the irritability.

In speaking of the principle of irritability he expresses himself in the following manner. "I think that the oxygen is absorbed by the blood, and that the venous blood is oxygenated in the lungs during respiration. The most celebrated naturalists and chemists are of a different opinion: they think that the oxygen does not combine with the venous blood. According to
" them,

“ them, this last loses carbon and hydrogen, and re-
 “ covers the bright colour natural to it, without absorb-
 “ ing any thing from the atmosphere. . . . After hav-
 “ ing a long time attended the phenomena of respira-
 “ tion, and made many experiments upon this subject,
 “ I think it may be concluded that one part of the
 “ oxygen of the vital air combines with the venous
 “ blood, of which it changes the black colour, and
 “ makes it vermilion ;* the second part of the oxygen
 “ unites with the carbon contained in the carbonic-hy-
 “ drogen gas, which exhales from the venous blood, and
 “ forms carbonic acid air ; a third part unites with the
 “ carbon of the mucus, contained in great quantities in
 “ the lungs, and which is continually decomposing ; this
 “ part also forms carbonic acid air ; a fourth part of the
 “ oxygen combines with the hydrogen of the blood to
 “ form water.”

On this theory I shall only observe, that though I lay
 claim to the former part, I allow the Doctor all the latter
 part to himself ; particularly where he speaks of the
formation of water to be exhaled during respiration. The
 air in question consists of two parts, like *fixed air* already
 mentioned. One of these is capable of being attracted,
 condensed, or united with certain substances ; the other
 vanishes, leaving no other traces of its having ever ex-
 isted, but heat, greater or less according to circumstan-
 ces. When the air is taken into the blood, one part of
 it undoubtedly combines with something thrown out by
 the lungs, and forms *fixed air*, of which our breath con-
 tains a considerable quantity. We know certainly that
 the condensable part of fixed air is formed out of the
 condensable part of the oxygen, with certain additions.
 As therefore great part of this condensable oxygen is
 thrown out in fixed air at every expiration, it is natural
 to suppose that all of it is so : at least we cannot know
 the

* Here Dr. Beddoes, from whose publication this account of Girtanner's
 memoir is taken, has the following note : “ Dr. Goodwyn had proved this
 before. Could Dr. Girtanner be ignorant of his experiments ? ” In justice
 to myself, however, I must observe that this very doctrine had been publish-
 ed in the *ENCYCLOPÆDIA BRITANNICA* long before either Dr. Goodwyn
 or Dr. Girtanner had made any experiments on the subject. It may still be
 seen under the article *BLOOD*, and reasons are there given for supposing that
 only *one* part of the oxygen, viz, the elastic part, can be absorbed.

the contrary without a series of very difficult and tedious experiments, which have never been made by Dr. Girtanner or any body else. But if the whole of this condensable part be thrown out, none can enter the blood by the breath; and consequently whatever true oxygen may afterwards be expelled from that fluid, must be a factitious substance, formed either during the artificial process, used for distilling it, or by a natural process in the body itself. It is not therefore at all probable that the oxygen which flesh emits in distillation can be derived from the air by respiration.

Another and more probable source is the food and drink we take; all of which are more or less impregnated with air of different kinds, particularly fixed air. This, we know, very readily condenses, and certainly will do so when taken into the body. In this state it not only may, but certainly will, pass into the blood, and through all the different parts of the body, until, having accomplished its purpose, whatever that may be, it is thrown out by insensible perspiration, as has been already explained.

The conclusions drawn by Dr. Girtanner from his experiments are, 1. That the change of colour which the blood undergoes during the circulation is not owing to its combination with hydrogen air.* 2. The deep colour

* Here it is necessary to observe, for the sake of accuracy and perspicuity, that, in the new chemistry, the terms of which are now very generally adopted, the words *oxygen* and *hydrogen* when mentioned by themselves are not understood to signify any kind of air, but what I have called the condensable part of the air. If the word *air* is added, then the whole substance of the fluid is understood. But though this is the strict orthodox language of the new chemistry, it is impossible to say whether every one who adopts the terms be sufficiently careful in this respect. Indeed this is one out of many inconveniences that might be pointed out which have arisen from this nomenclature; for thus the mere omission of a monosyllable, which may happen in numberless instances, totally perverts the meaning of the author, and may of course subject him to unmerited censure. Besides, it is not to be known, unless the author tells us so, that he designs to observe this strictness, and of consequence we must in multitudes of cases be uncertain of the meaning of what we read. Thus, in the present instance, when Dr. Girtanner speaks of *oxygen*, we know not certainly whether he means the air in substance, or only one of its component parts. Probably he means the condensable or solid part. If he does so, there must be a very material difference between his theory and that laid down in the Encyclopædia, and which is supported throughout this treatise. In the latter it is maintained that the condensable part is thrown out by the breath, being previously converted into fixed air, while the elastic part enters the vital fluid, communicating to it not only the red colour, but heat, and the principles of life and sensation, as will be more fully explained in the sequel.

colour of the blood in the veins is owing to the *carbon* it contains. 3. That the vermilion colour of the arterial blood proceeds from the oxygen with which the blood is conjoined during its passage through the lungs. 4. That respiration is a process exactly analogous to the combustion and oxydation of metals; that these phenomena are the same, and to be explained in the same manner. 5. That, during circulation, the blood loses its oxygen, and charges itself with *carbonic hydrogen* air, by means of a double affinity. 6. That, during the distribution of the oxygen through the system, the heat which was united with this oxygen escapes; hence the animal heat. 7. That the great capacity of arterial blood for heat is owing to the oxygen with which it is united in the lungs.

On these propositions, which constitute in a great measure the fundamental principles of the doctrine of *oxygenation* of the human body, we may remark,

1. Nobody can reasonably suppose that hydrogen air is the cause of the dark colour of the blood in the veins, because there is no source from which it can be derived; and, besides, it is certain that no kind of air can exist in its elastic state in the blood, without destroying the life of the animal. Some experiments proving this are given by Dr. Girtanner himself. It is true that an aerial vapour, of the nature of *fixed air*, exhales from the body by insensible perspiration; but there can be no doubt that this receives its elasticity only at the surface of the body, and is expelled the moment it is formed. It has indeed been proved, by undeniable experiment, that no air of any kind exists in the larger veins; because a portion of a vein, included between two ligatures, being cut out, and put under the receiver of an air-pump, does not swell in the least when the air is exhausted, which yet must be the case, did the smallest quantity of elastic air exist in it.*

2. When

* *Hydrogen* air is the same with that by Dr. Priestley called *inflammable* air. He also discovered the true composition of it. Having included a few grains of charcoal in the receiver of an air-pump, and exhausted the air, he heated it in vacuo by means of a large burning glass. The charcoal was entirely volatilized and converted into this kind of air. He found, however, that without some small portion of moisture this volatilization did not take place.

2. When the Doctor asserts that the dark colour of the venous blood is owing to the carbon it contains, he is in the first place chargeable with the error of former chemists, who supposed that every thing which could be extracted from any substance by fire, existed previously in it, in that very form in which it is extracted by the fire; and in the second place he speaks entirely at random, without even a shadow of proof. Nay, he himself tells us, that he has repeated two of Dr. Priestley's experiments, which in the clearest manner demonstrate, that neither the addition nor the abstraction of carbon, or any thing else, give this dark colour to the venous blood. "A small glass tube (says he) filled with arterial blood, of a bright vermilion, was sealed hermetically,* and exposed to the light. The blood changed its colour by degrees, and in six days became black as venous blood. The same experiment was repeated, with this difference only, that the tube was exposed to heat, and not to the light. The blood became black in a shorter time." In these experiments it is plain, that if the blood contained oxygen at first, it did so at the last; the same with regard to carbon. How came it then to pass, that without either evaporation of the former, or addition of the latter, the change should be produced? If the oxygen imbibed by the blood in the lungs was sufficient to produce the red colour, why did it not preserve it? The case here is precisely similar to what happens with the calx of silver. When that metal is dissolved in aqua fortis, and again reduced to a solid form, it appears as a white powder, and will preserve its colour if carefully kept from the light; but if a vial be filled with it, and exposed to the sun, that side on which the light falls will in a short time become black, and this though the vial has been ever so carefully sealed.† Formerly, chemists had a method

* A glass tube is sealed hermetically, by heating the open end or ends, till they become soft, and then closing them with a pair of pincers.

† Thus letters, or other characters, may be curiously marked upon the calx within the vial, by cutting them out in paper, and then pasting them on the side to be exposed to the light. We may have them in this manner either dark upon a white ground, or white upon a dark ground.

thod of accounting for this appearance, as well as that of the venous blood, by what they called the *evolution of phlogiston* : but now that the very existence of phlogiston is denied, we are deprived of this resource. But, whatever words we may use, it is plain that in neither case have we any ideas affixed to them which can make the matter at all more intelligible than it was before. But with regard to the blood, we are at a considerable loss to understand what the natural colour of it is ; and indeed the question can only be determined by examining the blood of a foetus which has never breathed. If the arterial blood of such a foetus be of a dark colour, resembling that in the veins of a grown person, we must look upon this to be *natural* to it, and we may as well inquire why a rose is red, or an iris blue, as why the blood is of a dark, and not of a bright red. But, if we find this dark red change to a bright scarlet in the arteries, as soon as the child has breathed, we have as much reason to conclude that the air occasions this superior redness, as that an acid is the cause of a red colour in the syrup of violets, or an alkali of a green colour in the same. Experiments are yet wanting to determine this matter. Mr. Hunter has observed that “ in such foetuses as convert animal matter into nourishment, they most probably have it (the colour of the blood) influenced by the air, such as the chick in the egg, although not by means of the lungs of the chick, we find the blood, in the veins of their temporary lungs, of a florid colour, while it is dark in the arteries.”— The probability therefore is, that the blood is naturally dark ; by the elastic principle of the oxygen that it is rendered brighter ; and that, this elastic principle being expended in the course of circulation, the fluid resumes its original colour.

3. Though enough has already been said to evince that the superior redness of the arterial blood is derived from oxygen gas, we shall still quote two instances from Mr. Hunter's Treatise on the Blood, which set this forth in the clearest manner ; and these instances are the more remarkable, because they demonstrate the phenomena

mena not of the *dead*, but of the *living* body. 1. A gentleman in an apoplexy, who seemed to breathe with great difficulty, was bled in the temporal artery. The blood flowed very slowly, and for a long time. It was as dark as venous blood. He was relieved by the operation; but, on opening the same orifice in two hours, the blood flowed of the usual florid colour. 2. A lady in an apoplexy was treated in the same manner, and Mr. Hunter observed, that when she breathed freely, the blood from the temporal artery assumed a bright red colour; but when her breathing was become difficult, or when she seemed scarce to breathe at all, it resumed its dark colour, and this several times during the operation.

4. Respiration is not, as Dr. Girtanner says, a process similar to the combustion and oxydation (the calcination) of metals. Some of these by calcination, and *all* of them in the opinion of Dr. Girtanner, unite with the condensable part of the oxygen contained in the air, while the elastic part is dissipated in flame or heat. The reverse of this takes place in breathing; for here the elastic part of the oxygen unites with the blood, and makes it warm, while the condensable part, uniting with certain particles to be thrown off from the body, passes away in fixed air. Thus the process of respiration does not resemble the calcination of a metal (at least according to our author's opinion of that operation) but rather the inflammation of some combustible substance; for in both cases a certain quantity of carbon is found to be united with the basis of oxygen in the atmosphere, and thrown off from the place of combustion; and thus a quantity of fixed air is produced from every burning substance. Just so is it with respiration. If the condensable part of the oxygen combined with the blood, then no fixed air could be produced; or if any part of the oxygenous base was absorbed, it must certainly be known by a proportional deficiency in the quantity of fixed air produced. But there are no experiments made with accuracy sufficient to determine this point. It is true that many very able physiologists, as Borelli, Jurin, &c.

&c. have been of opinion, that part of the air is absorbed in respiration ; but when we come to particulars nothing can be determined. Dr. Hales by experiment found the quantity absorbed to be a *sixty-eighth* part of the whole quantity inspired ; but, on account of supposed errors, he states it only at *an hundred and thirty-sixth* part. Between these two the difference is so enormous, that we know not how to draw any conclusion from them. The French chemists are more decisive, and agree pretty well with one another. Chaptal calculates it at *three hundred and fifty-three*, and La Metherie at *three hundred and sixty*, cubic inches in an hour. Allowing these experiments to be just, the next question is, what part of the air is absorbed. Lavoisier says, that it is the oxygenous base, or the same with that which is absorbed in the calcination of mercury. But how comes he to know this ? Surely not in the same way that he determines the absorption of it by mercury. In the latter case he takes a certain quantity of mercury, includes it in another known quantity of oxygen air, and heats the metal by means of a burning-glass or otherwise : the consequence is, that the air is absorbed, the mercury loses its fluidity, and is increased in weight. The metal gains the *whole* weight of the air absorbed ; and, by another process, *all* the air and *all* the metal, or very nearly so, may be obtained in their original form. This experiment is so decisive, that nothing can be said against it with any shadow of reason ; but who *hath* made, or who *can* make, similar experiments with the blood of a living man ? Such experiments indeed might be made, if *insensible perspiration* did not stand in our way. Common atmospherical air is about *eight hundred* times lighter than water. A cubic inch of distilled water, according to Dr. Kirwan, weighs *two hundred and fifty-three grains and a quarter*. Oxygen air is somewhat lighter than common air : we shall therefore suppose that six hundred inches of it are equal to an inch of water. If then the blood absorb three hundred and sixty inches of air in one hour, it will in twenty-four hours have absorbed eight thousand six hundred and forty inches, equal in weight to fourteen inches

inches of water and two fifths, which according to Dr. Kirwan's estimate is between seven and eight ounces. But the quantity of matter insensibly perspired in that time is so much greater, that no calculation can be made. Here is one mode of determining the quantity of oxygen inspired totally impracticable in the human body, though quite easy and practicable in the case of mercury. The other mode of determining it by the expulsion of oxygen from the blood is equally impracticable. Dr. Girtanner indeed has expelled oxygen from flesh; but we know not in what proportion, nor can we determine whence it came. With regard to this last, indeed, there are two sources allowed by Drs. Beddoes and Girtanner themselves; viz. the absorption of oxygen by the lungs, and the quantity taken in with the aliment. A third source was also manifest from Dr. Girtanner's experiments; viz. absorption from the atmosphere; for, by exposure to the atmosphere, flesh, which had once parted with its oxygen, became again impregnated with it. In this case therefore we must acknowledge that the uncertainty of the absorption by the lungs must be extremely great. A certain quantity of oxygen is undoubtedly thrown out in fixed air. How are we to determine this quantity? Certainly not by the first reverie that happens to occupy our imagination. It is a problem, the solution of which must be attended with the utmost difficulty. We must know, in the first place, how much oxygen was contained in the air *inspired*. In the second place we must know the quantity of fixed air *expired*. In the third place we must exactly know the proportion of oxygen contained in the fixed air thrown out by the breath. In the fourth place we must determine whether, by the conversion of oxygen into fixed air, any change is made in its bulk. For, if this shall be found to be the case, we should be led to suppose an absorption or augmentation of air when no such thing took place. This point therefore ought to be determined with the utmost accuracy. In the fifth place we must exactly know how much *azote, septon, phlogificated air* is contained in the atmosphere inspired,
and

and likewise in that expired. In the sixth place, we must be assured that there are no other fluids in the atmosphere capable of being absorbed by the lungs, excepting oxygen and azote. Whether there are any others or not, hath not been determined. From an expression of Dr. Fordyce, he would seem to be skeptical on the subject. "The atmosphere (says he) is found
 "to consist of various vapours, of which air, or, as it
 "has been called, pure air, or respirable air, (oxygen air)
 "forms at present about a fourth. Gas (probably fixed
 "air) forms some part;† but the greatest part consists
 "of one or more vapours, which, *without any positive*
 "*quality, but from that indolence which makes mankind*
 "*in their researches attempt to find a resting place, have*
 "*been considered by many chemists as one individual species,*
 "*under the names of phlogisticated air,"* &c. In the seventh place we ought to know what quantity of *pure oxygen*, unconverted into fixed air, or whether any such, is thrown out by the breath. That a quantity of this kind of air is really thrown out, is probable, because we can blow up a fire with our breath, and by a blow-pipe excite a most intense heat, capable of melting the most refractory metals, platina excepted. It is true that the eolipile, by the mere conversion of water into steam, will blow up a fire also; though, if the access of external air be denied, the blast of the eolipile will put the fire out. Probably the breath would do the same; but even this cannot be accounted a decisive proof of the oxygen being totally exhausted; for the moist vapour with which the breath abounds may extinguish the fire, even though some small quantity of oxygen should remain in it. It is not, however, our business at present to enter minutely into such discussions. From what has been already said,
 it

† It is now acknowledged that common atmospherical air contains a portion of what Dr. Black and Dr. Priestley have called fixed air; but this portion is so small (not more than one fiftieth part, according to Dr. Anthony Fothergill's Prize Dissertation, and *none at all*, according to Dr. Beddoes) I say, this proportion is so small, that we cannot suppose it to constitute the quantity of fixed air thrown out by the breath, which is very considerable. Besides, fixed air, of all others, is the most readily absorbed; and, indeed, if we could admit of absorption of any basis of air in the present case, it certainly ought to be that of fixed air; but where such a quantity is thrown out, we cannot well admit of any absorption.

it is evident, that the absorption of oxygen by the blood, instead of being indubitably established, is of all things the most uncertain; the requisites for determining it being absolutely beyond the investigation of any person, however accurate. We may indeed, with great labour and trouble, determine that some part of the air is absorbed in breathing; but what that part is, we are unable to discover from any chemical investigation. The opinion of the simplicity of metals, and their being reduced to a calx by the adhesion of oxygen, has been so implicitly, and in a manner universally, received, that it has given a new turn to physiology, so that, by a kind of analogical reasoning, the human body has been reduced to a mere chemical apparatus, the operations of which may be calculated as we can do the event of experiments in a laboratory. But, after a very long and tedious contest, Dr. Priestley seems at last to have overthrown this doctrine of oxygenation, even in the inanimate parts of the creation; so that we can much less apply it to the doctrines of life and animation. His experiments are published in the third number of the Medical Repository, volume II, and fully demonstrate, that, though mercury absorbs oxygen during calcination, this is not the case with all metals; that in many cases the oxygen will unite with other substances in preference to the metal, which last is nevertheless reduced to a calx as though it had united with the oxygen; that in many cases the addition of weight gained by the calx is owing to mere water, &c. He has likewise shown that phlogisticated air (azote) is not a simple substance, as has been taught by the new chemists, but consists, as well as fixed air, of an union of oxygen with carbon, or at least with the black matter of burnt bones, with which he made the experiment. These aerial fluids therefore being so easily convertible into one another, and the uncertainty of the changes in bulk which may occur in consequence of these conversions so great, it is impossible to say whether a portion of the atmosphere in substance, i. e. both oxygen and azote, is absorbed, as physicians formerly supposed; or whether

whether a portion of oxygen air alone be absorbed, as Dr. Beddoes supposes ; or whether only the elastic principle itself is absorbed, and the diminution in bulk made in consequence of the conversion of oxygen into fixed air ; I say, these matters depend on circumstances so much beyond the reach of our senses, that if we come to any probable conclusion upon the subject, it must be by analogical reasoning from other known facts, not from experiments made directly upon the living body ; which, in their own nature, must, lways be extremely vague and uncertain.

5. That, during the circulation, the blood charges itself with carbonic hydrogen air, is an assertion which cannot be easily admitted. It has already been observed, that, by the air-pump, venous blood does not appear to contain any elastic fluid whatever ; and it is also certain, that animals cannot bear any quantity of air injected into their veins. Dr. Girtanner himself tried several kinds, and all of them proved fatal. Having injected a considerable quantity of oxygen air into the jugular vein of a dog, the animal raised most terrible outcries, breathed very quickly, and with the utmost difficulty ; by little and little his limbs became stiff, he fell asleep, and died in less than three minutes. On injecting into the vein of another dog a small quantity of phlogisticated air, the animal died in twenty seconds. With carbonic acid gas (fixed air) a third dog died in a quarter of an hour. A fourth was killed in six minutes by nitrous air.* From these experiments, had no others ever been made on the subject, it seems very probable, that no species of air can be safely admitted into the blood in its elastic state. If any such therefore should naturally be produced in the body, it must either be instantly thrown out, or disease must ensue. Such objections to the Doctor's theory are so natural, that we might have thought he would have foreseen and provided against them. Instead of this he grounds the whole upon such slender evidence as could not be admitted in the most trifling matter. " An in-
" cision

* Nitrous air is that suffocating vapour which arises when aqua fortis is poured upon metals. When taken into the lungs it destroys animal life more quickly than any other species.

“ cision (says he) was made in the jugular vein of a sheep,
 “ and the blood which came from it was received into a
 “ bottle filled with nitrous air. When the bottle was
 “ half filled, it was closed. The blood coagulated im-
 “ mediately, and a separation of a great quantity of black-
 “ ish serum took place. The day after, on opening the
 “ bottle, a very strong smell of nitrous ether (dulcified
 “ spirit of nitre) was perceived, the nitrous air having
 “ been changed in part into nitrous ether by the car-
 “ bonic hydrogen gas of the blood. This experiment
 “ proves, beyond a doubt, that the venous blood contains
 “ carbonic hydrogen air; and that this air is not very in-
 “ timately mixed with it, but may be expelled with the
 “ greatest ease.”

On reading the Doctor's account of this experiment, it must be very obvious, that, however decidedly he may be of opinion that it proves *beyond a doubt* the existence of hydrogen air in the venous blood, yet there is not one solid reason, from what he says, for supposing any such thing. How can any man determine from the mere *smell* of *sheep's* blood taken out of the body of the animal, and mixed with a poisonous vapour, what is the composition of *human* blood in the living body? In the case of any substance suspected to contain elastic air, the air-pump will always afford an *experimentum crucis*. But we know that venous blood does not yield any elastic vapour by the pump: if instead of blood, however, we should fill a portion of vein with beer, cyder, or other fermented liquor, it would instantly discover, by its swelling up, that it really contained air in an elastic state. If then from the tumefaction of the vein when filled with fermented liquor we conclude that the latter contains fixed air, why should we not, from the non-tumefaction of it when filled with blood, conclude that the vital fluid contains no air? If Dr. Girtanner was so well assured that the venous blood contains hydrogen air, he ought to have expelled some of it from a portion of the blood, noted the difference between the blood which had lost its air, and that which had not, and then, by adding the air to it again, restored the blood to its former state.

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Nothing

Nothing less then recomposition can prove the truth of a chemical analysis ; as division can only be proved by multiplication, or multiplication by division.

From all that has been said, we may fairly conclude, that no proof can be brought sufficient to prove the existence either of oxygen air or any other species of aerial fluid, in its elastic state, in the blood. Neither can we prove that any part of the condensable part of oxygen air is received by the breath in the lungs. It is, however, probable that this condensable part may be received into the stomach with our food ; that having passed through the various channels of circulation, and arrived at last at the surface, it there resumes its aerial nature by combining with the superfluous heat of the body, and is evaporated through the pores of the skin by insensible perspiration. The aerial vapour which passes off by these pores indeed has been discovered to partake of the nature of *fixed air* ; but we know that this species of gas always contains the basis of oxygen, being indeed composed of it ; and whether the oxygen be taken into the body in its pure state or not, the result would undoubtedly be the same ; for an union would be formed between it and the carbonic particles to be thrown off from the body. But thus we can never suppose the basis of oxygen or any other air to be a permanent part of the composition of our bodies ; nor can the quantity of it be augmented by breathing any kind of air. The readiest way to increase the quantity seems to be by drinking fermented liquors. Thus, if the body is too hot, the superfluous heat will have a proper subject to act upon, viz. the condensable part of the fixed air ; and hence we may perhaps account for the very grateful and cooling sensation produced by drinking these liquors in some diseases. With respect to the existence of *carbon*, *charcoal* or *hydrogen* in the blood, it is probable that it exists in equal quantity at all times, being indeed the fundamental material of the whole body, and probably only a modification of that *dust* from whence man was originally taken.*

When

* In one of Dr. Priestley's papers above quoted he says, that *charcoal* is entirely of *vegetable* origin ; but the conversion of vegetable into animal matter,

When the blood therefore grows very black, when the teeth are covered with a black fordes, the hands become foul, &c. we may say, indeed we too surely *feel*, that, in such cases, there is a propensity in the body to return to its original state of dissolution; but there is not one solid reason for supposing the proportion of its materials to be varied; that there is a collection of *oxygen* in one part, *hydrogen* in another, or in short that nature can admit of any such disproportion taking place.

6. We must now consider Dr. Girtanner's account of the origin of animal heat, which is, that, "during the distribution of the oxygen through the system, the heat which was united with this oxygen escapes; hence the animal heat;" and, "that the great *capacity* of the arterial blood for heat is owing to the oxygen with which it is united in the lungs."—This leads us to consider in a more particular manner the doctrine of heat, a subject hitherto much less investigated than the importance of the subject requires. What little we do know of this matter seems to be almost entirely owing to Dr. Black, who hath discovered some very remarkable phenomena unknown to former philosophers. His discovery here, as in that of fixed air, was accidental. Making experiments on the water of different temperatures, he found that the mixture would always be an arithmetical mean betwixt the two quantities mixed. Thus,
on

ter, which we daily see, is an undoubted proof that there cannot be any essential difference between them. Even the bones are undoubtedly produced from vegetables in such animals as feed upon vegetable substances; so that even the calcareous earth they contain is plainly of vegetable origin. We may say indeed that the calcareous particles had a previous existence in the vegetables used by the animal as food; but we may say the same of the particles of the blood, flesh, horns, &c. Besides, Dr. Priestley has shown that *every* particle of charcoal may be volatilized into inflammable air, with as great accuracy as any human experiment can be made; so that in this case the calcareous particles, if any such there were, showed themselves to be as much charcoal as the rest. In the 74th volume of the Philosophical Transactions, Mr. Watt has shown, that dephlogisticated spirit of nitre may be changed into the smoking and phlogisticated kind by means of red-lead or magnesia alba, as well as by charcoal; of consequence there can be no essential difference even there. In short, so wonderful and multifarious are the transforming or metamorphosing powers of nature, that every attempt to find out a substance upon which these powers cannot act, will be found altogether vain, and our best conducted and most plausible experiments, made with a view to discover the ultimate composition or what we call the elements of bodies, will be found mere inaccuracy, bungling and blunder.

on mixing water at 50 degrees with an equal quantity at 100, the temperature of the mixture would be 75 degrees ; but if instead of using water only he took snow or ice for one of the quantities, the mixture was no longer an arithmetical mean betwixt the two temperatures, but greatly below it ; so that a quantity of heat seemed to be totally lost and in a manner annihilated. His attention was engaged by this unexpected phenomenon, and, prosecuting his experiments, he found that, when water was converted into ice, it really became warmer than it was before ; and, by keeping the fluid perfectly still during the time that cold was applied, he was able to cool it to 27 degrees of Fahrenheit's thermometer, which is five degrees below the freezing point ; but on shaking this water so cooled, it was instantly converted into ice, and the thermometer rose to 32. On reversing the experiment he found that mere fluidity in water is not sufficient to melt ice. A considerable degree of heat is necessary ; and even when this is previously given to the water, the whole becomes as cold as ice by the time that the ice is melted. The result of his experiments in short was this : Water, when frozen, absorbs an hundred and thirty-five degrees of heat before its fluidity can be restored : that is, supposing a pound of ice at the temperature of 32 to be mixed with a pound of water at the temperature of 32, by adding 135 degrees, so that the temperature of the water is augmented to 167, the ice will indeed be melted, but the temperature of the whole quantity of liquid will be reduced to 32. In this case therefore the heat manifestly assumes two different modes of action ; one in which it acts internally upon the substance of the body, without being sensible to the touch, while in its other state it hath no effect upon the internal parts, but affects bodies on the outside. The former state therefore the Doctor distinguished by the name of *latent*, the latter by that of *sensible* heat.

The same theory was applied to explain the doctrine of evaporation, and that in the most decisive and satisfactory manner. The Doctor found, that, in the distillation

distillation of water, much more heat was communicated to that in the worm-tub of the still, than could be supposed necessary to raise the water distilled to 212 degrees, which is the utmost that water can bear. In prosecuting the experiment he found the quantity of heat absorbed by the water, when raised into vapour, truly surprising; no less than *a thousand* degrees; an heat more than sufficient to have made the whole quantity of fluid that came over red hot. Some objections, however, were made to this theory, even by the Doctor's friends. Mr. Watt, particularly, though he could not deny the theory derived from Dr. Black's experiments, yet suggested one, which, had it proved successful, would have overthrown the whole. It was this: Let water be distilled *in vacuo*, where it boils with a heat of 97 degrees, and the operation must be carried on with much less fuel, and with much greater ease, than in the common mode. It was said that, in this experiment, Dr. Black was equally concerned with Mr. Watt; but, in a personal conversation with the Doctor himself, he assured me that he had no farther concern than foretelling that the experiment would not succeed, which it seems did not. The event was as follows: Mr. Watt, determining at all events to try the experiment, caused to be made a copper retort and receiver, joined together in one piece. In the receiver he pierced a small hole, and, heating both retort and receiver, plunged the latter into cold water. The consequence was, that a considerable quantity of water entered the vessel, and was easily poured back into the retort, as a subject for distillation. A fire being now applied, the water was soon raised into steam, which filled both retort and receiver, and in a great measure expelled the external air. The small orifice in the receiver being now closed, and the receiver itself plunged into cold water, the distillation went on *in vacuo*; for, as soon as any of the steam was condensed, the space which it had occupied (according to Dr. Black *one thousand and sixty-six* times more than the original water) was become absolutely empty, and more steam, rarefied, not by any quantity of sensible heat,
but

but merely by that which it contained in a *latent* state, would occupy the place of the former. The event of the experiment showed the truth of Dr. Black's theory. The water boiled, and steam was raised as well as if access had been given to the air ; but with this difference, that the upper part of the distilling vessel was never heated above what the hand could easily bear. With the water in the cooler it was quite otherwise. It became hot as usual, and, by the quantity of heat it received, plainly demonstrated that the vapour, though destitute of most of its *sensible* heat, yet contained an immense quantity in a *latent* state. The saving of fuel therefore in the practice of distillation, which was Mr. Watt's object in making the experiment, was quite trifling, and not equal to the trouble of filling the retort with liquid.

The doctrine of latent heat thus established, furnished a solution of many phenomena which could not formerly be explained in a satisfactory manner. Thus the melting of all kinds of substances was found to be owing to an absorption of heat, while their condensation was attended with the contrary. Fluidity in all cases was explained on the same principle ; and the more heat that was absorbed, the more fluid the matter became. Thus water, when in a condensed or solid state, absorbs 135 degrees of heat before it becomes fluid. A thousand degrees more convert it into vapour, and at last, by passing through the intense heat of a glass-house furnace, it is converted into a brilliant flame, and augments the heat of the furnace to a great degree. Hence the practice in glass-houses of throwing water into the ash-hole, the vapour of which, by passing through the burning fuel, makes the furnace much hotter than it was. In a similar manner were explained the phenomena of crystallization, the ductility of metals, the heat produced by hammering them, and the hardness produced by the operation, as well as the operation of annealing, &c. One other phenomenon, a very curious one, shall be noticed, on account of its being connected with the subject of this treatise. It is this : Let a small vessel filled with vitriolic ether be put into a larger one of water, and both included

included in the receiver of an air-pump. On exhausting the air, the ether boils, and is converted into vapour, while the water freezes. This shows that heat does not always act equally upon surrounding bodies, but has a tendency to enter some in preference to others; and from other experiments it appears, that this property has a considerable connexion with the density of the bodies concerned.

Thus one step was gained, and it was universally admitted that heat, in some cases, entered bodies, and in others was thrown out of them; but now the question arose, What is heat; and by what laws is it regulated, or from what source is it derived? Here Dr. Black himself was at a loss; for, as he supposed *cold* to be a mere non-entity, and only to consist in a comparatively smaller degree of heat, some phenomena occurred which would not easily admit of solution upon such an hypothesis. With these Dr. Black did not meddle much, but others were bolder. Dr. Irving, Professor of Chemistry at Glasgow, undertook to explain the whole mystery of latent heat upon the single principle of attraction. One of the most puzzling phenomena in the way of Dr. Black's theory had been, that in some cases heat and cold seemed to repel each other, and a very remarkable instance of this was, that, in the morning, a little before sunrise, when the rays of light pass through the atmosphere, a little above the surface of the earth, the air then becomes manifestly colder than even at midnight. Dr. Irving's explanation of this was, that the sun's rays *attracted heat from the atmosphere*, and thus rendered it colder. Such at least was the explanation given in an inaugural dissertation by Dr. Cleghorn, one of Dr. Irving's scholars; for the Doctor himself delivered his opinions only to them. In other cases he supposed that different substances had different *capacities* for receiving heat; and, of consequence, should the *form*, or rather the *internal constitution*, of the body be changed, the *capacity* of it for receiving heat must also be changed; and as an attraction subsists, or is supposed to subsist, between heat and all other substances, it is plain that while this attraction

attraction subsists, if the capacity of any substance for receiving heat be augmented, it will imbibe much more than it would have done had its former constitution remained. Thus *water* in its liquid state contains a certain quantity of heat; we may therefore say that water has a capacity for receiving heat equal to one to ten, or what we please. Vapour has a capacity for containing heat ten times greater than water. Water therefore, when converted into vapour, will imbibe ten times the quantity of heat that the water contains; and, again, on being re-converted into water, the *capacity* becoming what it was before, the superfluous quantity must be thrown out, as in Dr. Black's experiments. In like manner, when a metal is melted by the fire, the capacity of it for receiving heat is changed: of consequence a great quantity is imbibed, and again expelled by the change of *capacity* which takes place on its becoming solid; and thus, from the change of capacity, in different substances, every phenomenon was solved.

This doctrine of *capacities* did not give general satisfaction. Dr. Black himself said of it, that it was neither *probable* nor *ingenious*;* notwithstanding which, it continued to be received, and even very generally adopted. Dr. Crawford, so well known for his writings on this subject, has adopted the idea, and Dr. Girtanner, in the passage above quoted from him, appears to be of the same opinion. The doctrine, however, had several opponents, among whom were the Monthly Reviewers. In their account of Nicholson's First Principles of Chemistry, they express themselves in the following manner "We only wish, that, in the doctrine of heat, he had avoided, which he might easily have done, Dr. Crawford's idea of bodies having different *capacities* for heat. In the melting of ice, for instance, a quantity of heat is absorbed, without any increase of the temperature, that is, without making the water sensibly warmer than the ice before its liquefaction; which

" is

* These words are to be found in the M. S. Copies of his lectures circulated at Edinburgh. Dr. Black himself never published any thing to the world upon the subject.

" is said to be owing to the water having a greater ca-
 " pacity for heat, or being able to *hold more* of it, than
 " the ice ; and, in like manner, when converted into
 " vapour, its capacity is further increased, or it can hold
 " more still. This appears to us a very unchemical, and
 " a very inadequate idea of the matter : for, admitting
 " water to have a greater capacity than ice, how is the
 " change from one state to the other to be effected ?
 " Can the properties which a body is found to possess,
 " after a change has taken place, be assigned as a cause
 " of the change itself ? Or will it be said, that the heat
 " first enlarges the capacity, and then hides itself in that
 " capacity so enlarged ? We should think it much bet-
 " ter to say, consonantly with the phenomena of other
 " combinations in chemistry, that a certain quantity of
 " heat, uniting with the ice, first *liquefies* it, as a certain
 " quantity of acid only neutralizes an alkali ; that if
 " any surplus quantity must be introduced, that surplus,
 " remaining free and uncombined, must act and be sen-
 " sible as heat in the one case, and acid other ; and that
 " different bodies require different quantities of heat or
 " acid to be combined with them, for producing the
 " changes in question."*

Thus the Reviewers, as well as others, reasoned *a pri-*
ori, and several facts were adduced to prove that no such
 changes in capacity could take place. But however
 strong the arguments adduced, or however plain the ex-
 periments might be, little or no notice was taken of them,
 and the enlargement or diminution of *capacities* has been
 repeated, seemingly by rote, from one author to another,
 without the least inquiry or investigation. Dr. Girtan-
 ner indeed says that " the oxygen united with the arte-
 rial blood in the lungs" is the cause of the *great capacity*
 of the arterial blood for heat. But this is assigning a
 very doubtful cause for a very doubtful effect. He
 ought to have proved in the first place that arterial blood
 really has this capacity ; for its being *hotter* than the
 blood of the veins, only shews that it parts with more
 heat to surrounding bodies than venous blood does ;

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which

* Monthly Review, for 1790, p. 165.

which is a proof that it contains *less* heat, if there be any difference, than that of the veins. But the truth is, that the *capacity* for containing heat depends neither on the oxygenation nor hydrogenation of a fluid, but upon its density. The more fluid and the more easily expandible into vapour that any substance is, the greater quantity of heat it is capable of containing, and *vice versa*. This has been fully ascertained by Mr. William Jones, an English clergyman, whose observations on the generally received system of philosophy contain many particulars worthy of attention. From his experiments it appears that a piece of red-hot iron, thrown into water, imparts much less *sensible* heat to it, and is itself much more effectually quenched, than by throwing it into an equal quantity of quick-silver of the same temperature with the water. As the quick-silver therefore becomes much hotter to the touch than water does upon throwing a piece of red-hot iron into it, and as the iron itself is much more imperfectly quenched by the metal than by the water, it follows that the latter is capable of containing much more heat than the former. But such experiments are not applicable to the blood. Though that of the arteries may be somewhat hotter than the venous blood, yet the reason is obvious. The heat is communicated directly to the arterial blood in the lungs; but during the circulation a part of it evaporates, and the farther distant any part is from the lungs, the more cool will the vital fluid be, without regard to any alteration of *capacity*, which indeed never can be shown to exist.

But the most decisive experiments against any supposed alteration in the capacities of bodies for containing heat are those lately tried by Count Rumford, and related in the Philosophical Transactions for 1798. His attention to this subject was engaged by observing the great degree of heat acquired by a brass gun during the time of boring it,* and still more by the intense heat (much greater than that of boiling water) of the metallic chips separated from it by the borer. From a consideration

* Count Rumford was superintendant of boring the cannon in the workshops of the military hospital at Munich.

deration of these things he was naturally led to the following inquiries. "Whence comes the heat actually produced in this mechanical operation? Is it furnished by the metallic chips which are separated by the borer from the solid mass of metal? If this were the case, then, according to the modern doctrine of caloric, the *capacity for heat* of the parts of the metal so reduced to chips, ought not only to be changed, but the change undergone by them be sufficiently great to account for *all* the heat produced. But no such change had taken place; for I found, that by taking equal quantities by weight of these chips, and of thin slips of the same block of metal, separated by means of a fine saw, and putting them at the same temperature, that of boiling water, and putting them into equal quantities of cold water (that is to say, at $59\frac{1}{2}$ of Fahrenheit) the portion of water into which the chips were put, was not, to all appearance, heated either less or more than the other portion in which the slips were put."

From this experiment, several times repeated with the same result, Count Rumford inferred, that the heat could not possibly have been furnished at the expense of the latent heat of the metallic chips. He then proceeded to ascertain "how much heat was actually generated by friction, when a blunt steel borer being so forcibly shoved (by means of a strong screw) against the bottom of the bore of the cylinder, [of the machine in use] that the pressure against it was equal to the weight of about ten thousand lb. avoirdupois, the cylinder being turned round on its axis (by the power of horses) at the rate of about thirty-two times in a minute." In this experiment the metallic dust or scaly matter detached from the cylinder by the borer weighed only 837 grains troy; but, says the author, "Is it possible that the very considerable quantity of heat produced in this experiment (a quantity which actually raised the temperature of above 113 lb. of gun-metal at least 70 degrees of Fahrenheit's thermometer, and which of course would have been capable of melting $6\frac{1}{2}$ lbs. of ice, or making near five pounds of ice-cold water to
"boil)

“boil) could have been furnished by so inconsiderable a
 “quantity of metallic dust, and this merely in consequence of a *change* of its capacity for heat? As the
 “weight of this metallic dust (837 grains troy) amounted to no more than one 948th part of that of the
 “cylinder, it must have lost no less than 948 degrees of
 “heat to have been able to raise the temperature of the
 “cylinder one degree; and consequently it must have
 “given off more than *sixty-six thousand, three hundred and*
 “*sixty* degrees of heat to have produced the effects which
 “were actually found to have been produced in this
 “experiment.”

It was next considered whether the air did not contribute to the generation of this heat; and our author determined that this could not be the case; because the quantity of heat generated was not sensibly diminished when the free access of air was prevented. From another experiment it appeared that the generation of the heat was neither prevented nor retarded by keeping the apparatus immersed in water. Here the friction generated so much heat, that in one hour the temperature of the water surrounding the cylinder was raised from 60 to 107 degrees of Fahrenheit. In half an hour more it was raised to 142; at the end of two hours to 178; at two hours 20 minutes to 200; and in two hours and a half it boiled.* On the whole, Count Rumford concludes, that “the quantity of heat, produced equably by the
 “friction of the blunt borer against the bottom of the
 “hollow metallic cylinder, was *greater* than that produced
 “equably in the combustion of *nine wax candles*, each
 “three quarters of an inch diameter, all burning at the
 “same time with a clear, bright flame.” From all these experiments, however, our author does not draw any certain conclusion. “What is heat? (says he.) Is there
 “any such thing as an *igneous fluid*? Is there any
 “thing that can with propriety be called *caloric*? The
 “heat produced, in the author’s experiments, by the
 “friction of two metallic surfaces, was not furnished by
 “small particles of metal, detached from the larger solid
 “on

*The quantity was two gallons and a quart, wine measure.

“ on their being rubbed together. It was not supplied
 “ by the air, because the machinery in three experiments
 “ was kept under water, and the access of atmospherical
 “ air completely prevented. It was not furnished by the
 “ water which surrounded the machinery, because this
 “ water was continually receiving heat from the machi-
 “ nery and could not at the same time be giving to and
 “ receiving heat from the same body; and because
 “ there was no chemical decomposition of any part of
 “ this water.” At last he observes, that the source of
 this heat, whatever it is, must evidently be inexhaus-
 tible, adding, that “ any thing, which any *insulated* body,
 “ or system of bodies, can continue to furnish *without li-*
 “ *mitation*, cannot possibly be a *material substance*; and
 “ it appears to me to be extremely difficult, if not quite
 “ impossible, to form any distinct idea of any thing ca-
 “ pable of being excited and communicated, in the man-
 “ ner the heat was excited and communicated in these
 “ experiments, except it be MOTION.”

On this last paragraph, however, it is obvious to re-
 mark, that the whole force of the argument rests upon
 an *insinuation*, that the cylinder and borer were *insulated*,
 or cut off from all communication with any other ma-
 terial substance. Had this been the case, then no doubt
 it would follow that an *endless* supply of any thing *mate-*
rial could not be furnished by them; but if, as Dr.
 Boerhaave and many other learned and intelligent per-
 sons have supposed, fire be an element universally pre-
 sent, and which becomes sensible to the touch only in
 consequence of a particular mode of action, it will fol-
 low, that no substance in nature can be *insulated* with
 respect to it; but, in whatever place, and for whatever
 length of time, any substance shall be affected in such a
 manner as to agitate this fluid, there we shall perceive a
 production of heat *without limitation*, even though heat
 itself be no more than the action of a fluid essentially
material, though invisible to us.

Considerations of this kind occurred long ago to the
 writer of this treatise, when by the nature of his employ-
 ment it was necessary for him to speculate upon these
 subjects.

subjects. It could not then but appear to him that the theory of Dr. Black was far superior to any that had been published. The opinion of those who supposed fire to consist in the vibratory motion of the particles of solid bodies, seemed altogether untenable. It is impossible to explain the phenomena of heat upon ordinary mechanical principles, because, with respect to all terrestrial substances, heat constantly appears as an *agent*, while they are merely *passive*; and no man can explain the nature of a cause from its effect. Thus one of the most obvious effects of heat is *expansion*, or enlargement of bulk, in such bodies as are heated. But if from this fact we infer that the parts of elementary fire are repulsive of one another, our reasoning is certainly erroneous. In like manner, when we are not sensible of heat, we are not authorised to conclude that it is not present; for Dr. Black has demonstrated that it may be present in very great quantity, though undiscoverable either by our senses or by a thermometer.

But, with regard to the theory published by Dr. Black himself, it is evident that, though one part of it rests on the solid basis of experiment, the other is founded entirely upon hypothesis, and that too an hypothesis which cannot admit of being proved by any experiment, viz. that *cold* is a mere negative, and hath no real existence in nature. Among many phenomena which militate against this opinion, the following experiment of M. Geoffroy seems to be the most remarkable. He took a small basin filled with water, and set it on a support in the middle of a large tub of water, in such a manner that the temperature of the water in the tub might communicate itself to that in the basin. This being ascertained by a thermometer placed in the basin, he threw a quantity of burning coals into the tub. The effect of this, on the supposition that cold is a mere privation of heat, ought to have been, that the heat of the coals, communicated to the water in the large tub, would in a short time pervade the small basin, and affect the thermometer there. The latter would therefore rise; but instead of this it fell several degrees

degrees before it began to rise; for which it doth not appear that any other reason can be assigned than that the cold is partly repelled by the heat of the coals, and therefore, entering into the small basin of water, it causes the thermometer to sink previous to its rising. To the same purpose we may urge the phenomenon already taken notice of, viz. that the sun's rays, when passing at some distance above the surface of the earth, cool the lower part of the atmosphere. The natural solution is, that the heat of the sun partly repels the cold downwards; and as for the doctrine of *attracting* heat from the atmosphere, Count Rumford has shown that this does not happen in a case where we might with much more probability expect it; not to mention the violence done to the common perceptions of mankind by supposing the sun's rays, which are most evidently the source of heat, to have any occasion to *attract* heat from the atmosphere or any thing else.

Lastly, with regard to the *capacities* of bodies for containing heat, the doctrine appears to involve a radical error, of such enormous magnitude, that it is impossible to make any thing of it. This is no less than confounding the heat which flows out from bodies with that which they contain as an essential part of their composition, and which they cannot emit without being changed into some other form. Thus the capacity of aqueous vapour for containing heat, according to Dr. Black, is 1000 degrees; yet without decomposing the vapour it would have been impossible to have known this; for vapour is often extremely cold to the touch, and a thermometer immersed in it will sink greatly. In short, all that we can know about the capacity of bodies for retaining heat is, that they either continue to absorb it, or we may continue to force it into them, till they be reduced to vapour. It is doubtful whether they can receive more; for from the experiment with Papin's digester, formerly mentioned, it appears that the additional quantity of heat, which the water was made to receive, very quickly left it as soon as the steam had room to expand.

But,

But, to come to a conclusion upon this subject: If we will investigate the nature of heat, we must do it as in other cases, viz. by making the *igneous fluid, caloric*, or what we please to call it, the object of our senses; for we cannot reason fairly, or indeed come to any rational conclusion at all, by doing otherwise. In this investigation it is necessary to attend to the particulars mentioned by Count Rumford. The fluid must be omnipresent in its nature, infinite in its quantity, and equable, uniform and incessant in its action; as far as these epithets can be applied to any material being. There are only two fluids which we know that can answer to these characteristics. The one is the light of the sun, which pervades all the celestial spaces; the other the electric fluid, which penetrates every terrestrial substance. Both of these produce heat, unlimited in quantity, as well as in duration, provided their action be continually kept up. The mode in which both produce heat is exactly the same, viz. by converging into a focus; and the greater the quantity, the greater is the heat, and that without any limitation either as to intensity or duration. With regard to the solar rays, it has long been known that by concentration they would produce heat; nevertheless it was unaccountably doubted whether the rays themselves were the matter of heat. One objection to this was, that on the tops of high mountains the air is exceedingly cold, though the sun shines very bright. But this objection was founded upon an erroneous notion that, wherever the matter of heat exists, there we must feel it; which doth not follow any more than that wherever air exists there we must feel a wind blowing upon us. *Wind* is air in motion, and *heat* is a more subtile fluid in motion. One demonstration of this is, that, on the tops of the highest mountains, a burning lens or mirror will set fire to combustible bodies as readily as in the vallies at the foot of them. Neither has heat, properly so called, any thing to do with air. The focus of a burning-glass will heat bodies *in vacuo* as well as in the open air; and Sir Isaac Newton has observed, that if a thermometer be included in the vacuum of an air-pump,

air-pump, it will acquire the temperature of the room nearly in the same time that another will when included in a similar glass without any exhaustion.

The science of electricity is but of late date ; and most violent and hypothetical disputes have taken place concerning the nature of the fluid. Its luminous and burning properties naturally led a number of people to suppose that it was elementary fire ; but this was opposed by others with as much violence as if there had been something criminal in the supposition. The opposition, however, was founded upon the same error with that about the solar light. It was imagined that wherever elementary fire existed, there heat must be felt ; and it was especially urged, that electricity, though it produced light, did not produce any heat, except when it exploded with such violence as to penetrate the internal substance of bodies, agitating their particles, and by this agitation producing heat. It has now, however, been found, that the electric *aura*, as it is called, when made to converge in great quantity to the point of a needle, will heat it to such a degree as to set fire to gun-powder. This shows that heat is occasioned by the convergence of this fluid to a focus, and to its divergence from it. In the focal point, heat will always take place. From the experiments of Hauksbee, Beccaria and Priestley, it likewise appears, that electricity will render transparent the most opaque bodies, such as sealing-wax, pitch, &c. which even the most intense light of the sun cannot do. As to the intensity of the heat produced by it, experiments have shown, that it cannot be exceeded even by that of the most powerful mirror. Globules of gold have been vitrified, platina melted, and the most infusible substances reduced to glass, by means of the electric shock. From so many evidences, therefore, it appears to me impossible to conclude otherwise than that the light of the sun and the electric fluid are the same thing ; and, according to the different modes in which they act, they produce the phenomena of heat and light in all their varieties, besides a multitude of other effects of which we cannot have any perception.

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We may indeed, if we please, suppose that some other thing exists which is heat itself, and that the light or electric fluid sets in motion, attracts, repels, or acts otherwise upon this unknown something; just as it comes into our heads to fabricate our system. But, until our senses can discover in some way or other this hidden substance, *reason* will always suggest that it has no existence. We may say that without such a supposition we cannot solve the phenomena of heat. But do we ever expect to solve these phenomena; or do we know all that the solar light and electric fluid can perform? If we do not know what they *can* do, neither do we know what they *cannot*; and the invention of other fluids must be accounted not only chimerical but useless.

But, to be more particular: on the subject of heat people have embarrassed themselves more with philosophical reveries than by any real difficulty, and rendered the matter more obscure than nature has made it. We have already observed, that by the convergence of light, or of electricity, heat is always produced. Here we can see the mode in which the fluid acts, viz. first by *converging*, and then *diverging*. When the light falls upon a solid body, it is evident, that if it be allowed to flow out as easily as it flows in, no internal agitation of the parts, or of any fluid contained in them, can take place. Transparent bodies therefore are never heated. Again, if the light be not allowed to enter the substance of a body, but is entirely reflected, the body cannot be heated; and hence it is very difficult to melt a polished metal even by a strong burning-glass. M. Macquer's burning mirror, which vitrified flints, could not melt silver. But, when the light falls upon a body capable of allowing it to enter its substance, at the same time that it cannot get out without difficulty, it is plain that the force of the fluid will be exerted in order to overcome that difficulty; the body will be expanded in all directions; the fluid will be thrown out in the same manner, and the more that the internal action of the light prevails over that power by which the parts of the body cohere, the more will the phenomena of heat be perceptible.

Again,

Again, let us suppose that the ethereal fluid enters the substance of any body capable of being dilated to a great degree, it is equally plain that the action of the fluid must for some time be directed only upon the internal parts, and consequently will be imperceptible on the outside. This then is called *latent* heat; and where the pressure on the outside balances that on the inside no heat will be perceptible to the touch. But by whatever means this balance is broken, heat will instantly be perceptible; and experiments show that the balance may be broken either by an increase of cold or heat. Thus, in the case of water, the internal pressure remains equal to the external, until the fluid is cooled to a few degrees below 32. The balance is then broken, and the internal action prevails; a quantity of what is called *sensible* heat escapes, and the water is converted into ice. Again, at the temperature of 32, little or none of the water evaporates; but by the addition of heat, by which the internal action of the subtile fluid we speak of becomes greater than the external, the water is converted into vapour; and it is remarkable that the same effect takes place on greatly augmenting the degree of cold; for the evaporation from ice, even in frosty weather, is found to be very considerable.

On the whole, from innumerable experiments it appears, that there exists in nature a certain invisible fluid, by the action of which, when diverging from a centre, heat is produced in the central point. By a certain other power this diverging force is limited, so that in some cases it is not perceptible beyond the surface of the body in which it acts, and then it is called *latent* heat. In other cases it is perceptible in a certain degree, and the degree in which it is perceptible hath been called the *temperature* or *sensible heat* of the body. On mixing different substances together it is found, that very often the proportions between the external and internal actions are varied. This has been already observed, when giving an account of Dr. Black's discovery of *latent* heat, viz. that when snow and warm water are mixed together the temperature of the mixture differs very considerably from

from the arithmetical mean between the temperatures of the two substances employed. Dr. Crawford prosecuted the experiment further, and found that there were few substances which, on being mixed, did not shew a temperature different from that of the arithmetical mean between the temperatures of the two originally employed. This difference he unfortunately used as the foundation of a rule for determinining the *capacities* of different substances for containing heat, and upon this erroneous principle has raised a superstructure, which upon no occasion can be of service to science, but must always produce obscurity and confusion wherever it is introduced.

With regard to the power which sets bounds to the expansion of the fluid acting as heat, it is natural to think that it can be no other than the same fluid acting in a contrary direction, or from a circumference towards a centre; and thus we shall always find that the same fluid, by limiting its own operations, may produce those phenomena which have been hitherto deemed so difficult of explanation. In what manner this limitation is in all cases effected, or indeed in any case, we cannot pretend to explain. It is sufficient to observe, that wherever there is a perpetual *efflux* of any thing, there must be also a perpetual *influx* at the same time, and in proportion to the one the other will be. These two are directly contrary to one another, and, as we suppose the fluid to be universal, it is evident, that if any part of it be put in motion in a particular direction, the rest will press towards that part where the motion is, in order to keep up the equilibrium. Hence we may easily account for the heat produced by percussio or by friction. By hammering a piece of iron, as Dr. Black justly observes, the fluid is forced out from between the parts of the metal. The emission of this fluid in all directions is heat itself; and no sooner is one quantity thrown out than another supplies its place with great rapidity, and so on, until the pressure of the rest in some way or other counteracts the emission of any more, and the heat ceases. Just so with friction. The heat produced by it is always in proportion to the pressure employed. By this pressure

pressure the parts of the two substances are forced into such close contact, that an agitation and emission of the fluid pervading their substance takes place. This agitation, as we have already noticed, is heat itself, and, as long as the friction is continued, more and more heat will be produced, without any limitation, as Count Rumford has observed.

Some bodies have a greater disposition than others to emit this subtile fluid ; and these we say are naturally of a warmer temperature than others. The *temperature* is nothing else than the efflux of the fluid from them, continually kept up by the action of the surrounding fluid. By mixture with different substances the temperatures of various bodies may be changed ; by some the influx, and by others the efflux, may be augmented. In the former case we say the body becomes colder, in the latter hotter, than before ; and in not a few cases the agitation of the fluid becomes so great that the matter actually takes fire. In all these cases, however, we can discover nothing more than the bare fact, that so and so is the case. We know that the bodies do grow hot by the convergence of the ethereal fluid towards them, and its emission from them ; but why it should converge or diverge we know not.

Thus much with regard to heat in general. We must next consider another fluid which has very generally been accounted the source and fountain of heat, viz. *air*. This is indeed so much the source of heat in all our operations, that it was natural to think it the only one ; but experiments have now determined that air itself is a mere creature of heat and light ;* for, by employing these in a proper manner, airs or gases of all kinds have been produced. Thus, by exposing water in a glass vessel for some time to the rays of the sun, a quantity of very pure oxygen air may be obtained ; by concentrating the sun's rays upon charcoal, inflammable air may be had ; and by distilling, with a strong heat, substances of various kinds, we may obtain a great variety of aerial vapours. From all this we may reasonably

* Dr. Priestley thinks water is an *essential* in the composition of air.

from the arithmetical mean between the temperatures of the two substances employed. Dr. Crawford prosecuted the experiment further, and found that there were few substances which, on being mixed, did not shew a temperature different from that of the arithmetical mean between the temperatures of the two originally employed. This difference he unfortunately used as the foundation of a rule for determining the *capacities* of different substances for containing heat, and upon this erroneous principle has raised a superstructure, which upon no occasion can be of service to science, but must always produce obscurity and confusion wherever it is introduced.

With regard to the power which sets bounds to the expansion of the fluid acting as heat, it is natural to think that it can be no other than the same fluid acting in a contrary direction, or from a circumference towards a centre; and thus we shall always find that the same fluid, by limiting its own operations, may produce those phenomena which have been hitherto deemed so difficult of explanation. In what manner this limitation is in all cases effected, or indeed in any case, we cannot pretend to explain. It is sufficient to observe, that wherever there is a perpetual *efflux* of any thing, there must be also a perpetual *influx* at the same time, and in proportion to the one the other will be. These two are directly contrary to one another, and, as we suppose the fluid to be universal, it is evident, that if any part of it be put in motion in a particular direction, the rest will press towards that part where the motion is, in order to keep up the equilibrium. Hence we may easily account for the heat produced by percussio or by friction. By hammering a piece of iron, as Dr. Black justly observes, the fluid is forced out from between the parts of the metal. The emission of this fluid in all directions is heat itself; and no sooner is one quantity thrown out than another supplies its place with great rapidity, and so on, until the pressure of the rest in some way or other counteracts the emission of any more, and the heat ceases. Just so with friction. The heat produced by it is always in proportion to the pressure employed. By this pressure

pressure the parts of the two substances are forced into such close contact, that an agitation and emission of the fluid pervading their substance takes place. This agitation, as we have already noticed, is heat itself, and, as long as the friction is continued, more and more heat will be produced, without any limitation, as Count Rumford has observed.

Some bodies have a greater disposition than others to emit this subtile fluid ; and these we say are naturally of a warmer temperature than others. The *temperature* is nothing else than the efflux of the fluid from them, continually kept up by the action of the surrounding fluid. By mixture with different substances the temperatures of various bodies may be changed ; by some the influx, and by others the efflux, may be augmented. In the former case we say the body becomes colder, in the latter hotter, than before ; and in not a few cases the agitation of the fluid becomes so great that the matter actually takes fire. In all these cases, however, we can discover nothing more than the bare fact, that so and so is the case. We know that the bodies do grow hot by the convergence of the ethereal fluid towards them, and its emission from them ; but why it should converge or diverge we know not.

Thus much with regard to heat in general. We must next consider another fluid which has very generally been accounted the source and fountain of heat, viz. *air*. This is indeed so much the source of heat in all our operations, that it was natural to think it the only one ; but experiments have now determined that air itself is a mere creature of heat and light ;* for, by employing these in a proper manner, airs or gases of all kinds have been produced. Thus, by exposing water in a glass vessel for some time to the rays of the sun, a quantity of very pure oxygen air may be obtained ; by concentrating the sun's rays upon charcoal, inflammable air may be had ; and by distilling, with a strong heat, substances of various kinds, we may obtain a great variety of aerial vapours. From all this we may reasonably

* Dr. Priestley thinks water is an *essential* in the composition of air.

bly conclude that heat, attached to some other substance, dissolved in it in such a manner as to become invisible, forms the substance of air. Heat therefore being the agent in the composition of air, it is reasonable to suppose that it is the agent in its decomposition also, or in its transformation from one species to another, of which the conversion of oxygen into fixed air by combustion is an instance. When air is taken into the lungs the blood is warmed by the action of that invisible fluid, which has already given elasticity to the air. In consequence of a considerable quantity of this fluid being then converted from a latent into a sensible state, part of the elastic principle must be lost, and the air diminished in bulk. The reason why this must constantly take place is, that part of the heat evaporates from the surface of the body, during the course of circulation. Were it not so, the quantity thrown out by the lungs would be exactly equal to that which the blood received, and consequently there could be no diminution between the bulk of the air expired and that which was inspired; but, on account of the waste just mentioned, the blood must always receive somewhat more than it gives out by the breath. Thus, while the air we breathe continues the same, and the organization of the body is not changed, the natural operations will go on smoothly, and health will continue; but, as we have formerly observed, by an alteration of either of these, disease must ensue; and we must now endeavour, from the principles laid down, to examine the mode in which epidemic diseases, and particularly the plague, may be produced.

The air is so evidently connected with human life, that it has been from the earliest ages accounted the source of pestilential diseases, though, as none of the more obvious qualities of it, such as heat, cold, moisture, or dryness, appeared to be connected with them, they were generally supposed to proceed from the action of some unknown natural cause, or from that of the Deity himself. Some, however, have also been of opinion that plagues might originate from the obvious qualities of the

the air in conjunction with certain effluvia from putrid vegetable or animal bodies. Thus, in several plagues mentioned in ancient history, we find swarms of dead locusts, grasshoppers, the carcases of those slain in battle, crowded houses, and filth of all kinds, assigned as causes. This opinion was adopted by Dr. Mead, and he gives the following account of the origin of the plague in Egypt. "Grand Cairo is crowded with inhabitants, who for the most part live very poorly and nastily; the streets are narrow and close; it is situate in a sandy plain, at the foot of a mountain, which, by keeping off the winds that would refresh the air, makes the heats very stifling. Through the midst of the city passes a great canal, which is filled with water at the overflowing of the Nile; and, after the river decreases, is gradually dried up: into this canal the people throw all manner of carrion, filth, &c. so that the stench which arises from this and the mud together is insufferably offensive. In this posture of things, the plague every year preys upon the inhabitants, and is only stopped when the Nile, by overflowing, washes away this load of filth; the cold winds, which set in at the same time, lending their assistance by purifying the air." He then proceeds to account for the plagues in Ethiopia in the manner above related, viz. by the prodigious swarms of locusts, which sometimes occasion a famine by devouring the fruits of the earth, and, when they happen to be cast by the winds into the sea, occasion a pestilence; the putrefaction being heightened by the intemperance of the climate, which here is so great that it is infested with violent rains for three or four months together; and it is particularly observed of this country, that the plague usually invades it whenever rains fall during the sultry heats of July and August. He next takes notice of what the Arabians say of the origin of the plague in Ethiopia, viz. that it is brought on by unseasonable moistures, heats, and want of winds. But, whatever truth may be in the account given of the Ethiopic plagues, the testimonies already produced in this treatise are sufficient to render it very doubtful,

doubtful, at least, whether the plague ever does originate in Cairo, or any other place in Egypt. Besides, if we once admit the existence of any thing as a cause adequate to the production of a certain effect, wherever that cause exists the effect ought certainly to follow, unless where we plainly perceive something which prevents its action. It is not fair reasoning to say that the action of the cause is prevented by something unknown, for we might as well say that this unknown something is the cause originally, and acts only upon certain occasions, or when it thinks proper. Now, if the filth of the canal of Cairo be the cause of the plague in that city, it ought to recur annually at the season when that filth exists in greatest quantity, and in the most putrid state. Nevertheless we have the express testimony of Mr. Eyles Irwin, that at the time he was in Cairo there had not been any plague for seven years. The account he gives of it is a kind of contrast to that above quoted from Dr. Mead. “ *Misir al Kaira*, says he, or the *City of Anguish*, so called “ from the frequent visits which it has received from the “ plague, but commonly called *Grand Cairo* by us, is situated in lat. 30 degrees 3 minutes N. on an artificial “ branch of the Nile. Old Cairo nearly faces the river; “ but the new city is removed above a mile from it, and “ approaches to the range of mountains which runs “ through Upper Egypt, and abruptly breaks off here. “ It is undoubtedly one of the finest cities in the east; “ which, from the present style of architecture that reigns “ among the orientals, is but a faint commendation. “ The houses are in general built of stone, and, being “ elevated to several stories, would make a grand appearance, notwithstanding the inelegance of their “ structure, were not the effect destroyed by the excessive narrowness of the streets. This is one of the “ causes to which the ingenious Dr. Mead ascribes the “ birth of the plague in this capital; but experience “ evinces that it arises from *foreign and adventitious* causes. “ *There has not been a plague here these seven years*; which “ is rendered more remarkable by the commencement “ of the Russian war at the date of its cessation. No

“ one

“one can account for this; though a year seldom passed by before without a visit from it.”*

From this it plainly appears, that, however these putrid effluvia may concur with other circumstances in producing the plague, they are by no means the *only* cause; otherwise not a single year could have passed in Cairo without a pestilence; and the very same thing we shall find to hold good in every other, let us choose for a cause what we will. In order to investigate this matter fully, we must now consider what causes have been assigned by physicians for other epidemical diseases; and here, to avoid prolixity, we shall chiefly confine ourselves to those enumerated by Dr. Fordyce as the causes of fever; a gentleman whose very extensive experience must give the greatest weight to his testimony.† The principal causes assigned by him are,

1. *Infection*, or “a peculiar matter generated in the body of a man in fever, which is carried by the atmosphere, and applied to some part of the body of a person in health, and which causes fever to take place in him.” That such a cause exists, he proves from observing that “of any number of men, one half of whom go near a person ill of a fever, and the other half do not, a greater number of the former will be infected, in a short period afterwards, than in those who do not.” He says he has known, in such circumstances, seven out of nine infected with the disease. This infection is not discoverable by smell or any other organ of sense; neither can the greatest attention to cleanliness disarm it of its malignity. Of this the Doctor says that he has known instances; nay, of a person going into a room where a feverish patient was, and bringing with him the infection, which was communicated to others in the room to which he came. He owns, however, that by allowing the air to stagnate in which feverish patients are, the infection will

* Irwin's Voyage up the Red Sea, p. 335.

† At the time of writing his treatise Dr. Fordyce informs us, that he had been “for upwards of twenty years one of the three physicians of St. Thomas's Hospital (in London) whose walls have contained nearly four thousand patients every year, where the proportion of fevers to other diseases is much greater than the general proportion.”

will become extremely violent and fatal. This may naturally be supposed, even without having recourse to putrid effluvia; because, independent of these, the imperceptible infectious matter itself will undoubtedly be accumulated in the atmosphere of the room, and act more powerfully than it could have done had it been partly carried off and diluted by attention to cleanliness and ventilation. He also says, that “when a number of persons live in a small space, supposing even that they are kept as clean as possible, it happens frequently that fever arises in some, often in many of them. It has been in this case supposed, and is extremely probable, that some peculiar species of matter is *produced*, capable of producing fever, on being applied to the body.”

2. *Effluvia from putrid animal or vegetable matters.* Of this our author seems to be less fully ascertained than of the former, as he does not say that he has observed any instances of fevers arising from this cause; and he concludes by observing that “either the cause of fever, consisting of matter produced in the body of a person affected with this disease, seems probably different from that produced by putrefaction, or might be generated without any putrefaction taking place.”

3. *Cold.* Our author “is not disposed to allow that sudden exposure to cold occasions fever to take place, unless some symptom of the disease follows immediately. If a man had been suddenly exposed to cold, and continued in perfect health for *twenty-four* hours, the author would never allow that fever, or any other disease, was occasioned by it. In this case (exposure to cold) the evidence is much stronger than in that of infection; for the author (Dr. Fordyce) has seen many instances where, from exposure to cold, the commencement of the attack was instantaneous; and many are to be found in the records of medicine.”

4. *Moisture.* On this subject the Doctor observes, that the application of water to the body is not a cause of fever, unless the air has particles of water floating in it; in which case fever has ensued more frequently than in other cases. Water may exist in the atmosphere in
three

three states. 1. In small drops suspended in it like dust in water. 2. In vapour. In this case the transparency of the air is not impaired, and a *chemical* combination, as it is called, between the air and water takes place. If the atmosphere be hot or dense, it is capable of combining chemically with a larger proportion of water. If therefore the atmosphere should in this manner be saturated with water, at any particular degree of heat or density, by diminishing either of these the vapour will be condensed, and the water reduced to the former state of suspension in small particles. 3. Water, heated to the boiling point, emits a steam, which combines chemically with the atmosphere, till the latter be saturated, after which it assumes the form of small particles; and *this last is the only state* which has been found to produce fever.

Moisture will also produce fever when applied to the body by wearing wet clothes. Those which imbibe or part with heat most slowly, are least apt to produce fevers on being heated. The warmer the atmosphere, the more liable people are to fevers from moisture.

It has been observed, that moisture from marshes, stagnating canals, or where the water runs very slowly, is more apt to produce fevers than what proceeds from the sea, lakes or rapid rivers. "This (says the Doctor) has given occasion to suppose that some other vapours proceed from such marshes beside water, and produce the disease. It certainly often happens, that a considerable degree of putrefaction takes place in marshy grounds, and more especially in warm climates; but it is by no means to be concluded that moisture in the atmosphere always produces fever in consequence of putrefaction. Putrefaction can only take place in vegetable or animal substances. If water therefore, not impregnated with either, should be in such a situation as to produce moisture in the atmosphere, no putrefaction can take place; therefore, if fevers ensue, they are certainly in consequence of moisture, not putrefaction. Many instances of this may be brought, as in the war which took place in Flanders, between the tenth and eleventh year of the present century, an army

" my

“ my encamped upon sandy ground, in which water was
 “ found in digging less than a foot deep, and occasioned
 “ a great moisture in the air, which produced in a few
 “ days numbers of fevers, although the army was per-
 “ fectly healthy before, and no more fevers were produ-
 “ ced on shifting their ground. There are a vast many
 “ other instances of the same thing having taken place.
 “ Besides, fever has often arisen immediately in persons
 “ sitting in rooms, the floors of which had been just
 “ moistened with pure water.”

5. *Certain kinds of food.* On this Dr. Fordyce observes, that, though food of difficult digestion undoubtedly produces a number of diseases, he has never seen it productive of fever excepting once. Dr. Girtanner relates, that the emperor of Germany, having forced a number of his subjects to serve as soldiers, and sent them into an unwholesome part of Walachia, where he fed them with a kind of paste made of bread and water instead of meat, many of them died of the scurvy. The Doctor, however, does not ascribe this to any positive cause, but to three *negatives*, viz. the abstraction of the stimulus of *nutriment*, by feeding on the paste just mentioned; of the stimulus of *oxygen* in the corrupted atmosphere of Walachia; and lastly of the *nervous stimulus*, the most powerful of all; the greatest part being engaged by force against their will. This corroborates what Dr. Fordyce has said, that bad food is very seldom the cause of fever; for among so many, who used the *imperial* paste just mentioned, some would certainly have been affected by fevers, had it been capable of producing them; but, as it did not, it is most evident that the deficiency of *stimuli* is not the cause of fever.

6. *Passions of the mind.* These are looked upon by Dr. Fordyce to be among the less frequent causes of fever, though it is certain that they have been productive of multitudes of diseases, and even of sudden deaths; and Dr. Falconer, in his Prize Dissertation, ascribes to the passions very considerable effects in fevers, and even in the plague itself. “ Contagious fe-
 “ vers (says he) afford strong instances of the influence
 “ of

“ of mental affections, both as prophylactics and reme-
 “ dies. The plague is a remarkable example, and the
 “ same reasoning extends to other disorders of a febrile,
 “ contagious nature. Fear, it is well observed by Dr.
 “ Cullen, by weakening the body, and thereby increas-
 “ ing its irritability, is one of the causes which, concur-
 “ ring with contagion, render it more certainly active,
 “ which he ascribes to its weakening effect on the body,
 “ by which its irritability is increased. Against this
 “ therefore he directs the mind to be particularly forti-
 “ fied, which is best done by giving people a favourable
 “ idea of the power of preservative means, and by de-
 “ stroying the opinion of the incurable nature of the
 “ disorder, by occupying the mind with business or la-
 “ bour, and by avoiding all objects of fear, as funerals,
 “ passing-bells, and any notice of the death of particular
 “ friends. Even charms might be used with good effect,
 “ could we promote a strong prepossession of their effi-
 “ cacy, either by the confidence they inspire, or by their
 “ engrossing the attention of the mind. It is no less
 “ certain, that a studious regard to promote hope and
 “ confidence in recovery, is equally necessary for the
 “ cure as for the prevention of such disorders. We
 “ know that contagious fevers have a peculiar tendency
 “ to diminish the energy of the brain, and of course to
 “ debilitate the whole system ; and that this is especially
 “ the case with the plague, which produces the most con-
 “ siderable effects in weakening the nervous* system or
 “ moving powers, and in disposing the fluids to a general
 “ putrescency ; and Dr. Cullen is of opinion that to these
 “ circumstances, as the proximate causes of the plague,
 “ regard should chiefly be had, both for the prevention
 “ and cure of this disorder. It must therefore be highly
 “ necessary, during the course of this disease, to attend
 “ to the support of the spirits, as on these the vital prin-
 “ ciples greatly depend ; and they can by no means be
 “ so effectually kept up as by inspiring a confidence of
 “ recovery.”

Dr.

* “ An intense head-ach, uncommon giddiness, and a sudden loss of strength, were the first complaints of those who were seized with this distemper.”

(Russet on the Plague at Aleppo, p. 230.)

Dr. Zimmerman presents us with a great number of examples of the influence of the passions in producing diseases, or death itself; some of the most remarkable of which follow. "All the passions (says he) when carried to excess, bring on very formidable diseases. Sometimes they occasion death, or bring us at least into imminent danger. The most reputable physicians agree in opinion that terror may occasion apoplexy, and death; and indeed they consider apoplexy as the most common effect of violent passion. Without being carried to excess, a passion will sometimes occasion a difficulty of breathing, together with a sense of stricture in the breast, and an hesitation to speak; the tongue remaining as it were immoveably fixed on the palate. Hysterical and hypochondriacal affections are sometimes the effects of grief in the most healthy people. Joy is much more dangerous to life than sudden grief. Sophocles died through joy at being crowned on account of a tragedy he had composed in his old age. The famous Fouquet died on being told that Louis XIV had restored him to liberty. The niece of the celebrated Leibnitz, not suspecting that a philosopher would hoard up treasure, died suddenly on finding under her uncle's bed a box containing sixty thousand ducats. Violent anger has sometimes produced hæmorrhages and subcutaneous extravasations; or, some vessel of the brain being ruptured by these transports, a fatal apoplexy has taken place. There have been instances of excessive anger being succeeded by epilepsy, colic, or a violent degree of fever. Sometimes it has occasioned an increased flow of bile. In some this produces vomiting; in others it goes off downwards, and causes diarrhœa; or being retained, from a stricture of the gall-ducts, will perhaps be absorbed, and occasion jaundice. In cases where anger has been succeeded by extreme grief, obstructions have taken place in the liver. The effects of terror are similar to those of anger, but in general more violent. Sometimes excessive terror seems to give to men a preternatural strength, as is the case with madmen and drown-

ing persons. In some cases it has not only excited im-
 mediate convulsions, but caused them to return peri-
 odically. Fear has been said to make the hair stand
 upright, and to contract the pores from which the hairs
 issue in the same manner as cold does. There are in-
 stances in authors even of the colour of the hair be-
 ing changed by excessive fright. Philip V died
 suddenly on being told that the Spaniards had been
 defeated, and, on opening him, his heart was found
 ruptured. Timid people are more liable than others
 to fall sick. A firmness of mind is one of the best
 preservations against contagion. Willis has very well
 observed, that they who fear the small-pox the most
 are generally the first to be attacked with it. Cheyne
 assures us that fear is extremely prejudicial in all epi-
 demical diseases. Dr. Rogers remarks, that fear con-
 stantly increases the ravages of a contagious disease.
 Rivinus attributed the propagation of the plague at
 Leipzig wholly to fear. The French physicians, who
 wrote on the plague at Marseilles, went so far as to
 deny its being contagious, and ascribed its propaga-
 tion chiefly to fear."

As for the cause of the plague itself, Dr. Fordyce sup-
 poses it to be produced by an infection of a particular
 kind. That which takes place in Syria and Egypt, he
 says, has only been clearly described by Dr. Ruffel; and
 it cannot be gathered from the accounts whether this
 may be originally produced without having been propa-
 gated as the first class of infections above mentioned are.
 That disease (says he) called the plague, which ravaged
 this country (England) on considering the histories of
 the disease, seems to have been a *fever*,* produced by
 infections of the first class which have been enume-
 rated." Dr. Moore has given an account of the ori-
 gin of a plague, which, if it could be depended upon,
 would decide the question concerning the origin of this
 dreadful distemper without previous infection. This
 passage is extracted from the History of the Royal
 Medical

* This is expressly denied by Dr. Hodges, who had innumerable opportuni-
 ties of seeing the distemper.

Medical Society for the years 1777 and 1778. “ Dr. Mitchell, physician to the hospital at Smyrna, appears, according to a memoir of which he is the author, sent by M. le Baron de Tott to the Medical Society to believe in the spontaneity of the plague (or that it arises of itself without any predisposing cause in the body) for proof of which he cites the following circumstance : A solitary shepherd, having no communication with any body, fell sick while he was tending his flocks ; he went into an inhabited part, where he communicated the plague with which he found that he was attacked. This circumstance would prove much, if it was certain that the shepherd had no communication with others ; if it were known how long, and with what precaution, he had been secluded from company : but the proofs of these are too difficult to be established to allow of any conclusion to be drawn from the fact. We are obliged therefore to acknowledge [it to be a doubtful matter] whether it is in fact a country that is the cradle of the plague ; what country this is, supposing that such an one exists ; or, finally, whether it sometimes appears spontaneously, and whether the first whom it attacks becomes the focus from whence it emanates.”

Dr. Fordyce, in treating of the origin of fever, seems inclined to think that it may arise without any predisposing cause ; and after having enumerated the various causes already mentioned, and fully considered them, gives it as his opinion, that “ there must undoubtedly be other causes than those which give occasion to the disease, but which are at present *totally unknown*.” In like manner Dr. Moore, speaking of the nervous fever, sums up what may be known concerning the cause of it in the following words. “ Upon the whole, we know that people of delicate, exhausted and sickly constitutions, and those whose minds are saddened by depressing passions, are greatly predisposed to this disease, the immediate seeds of which, we also know, may be generated in places where human effluvia are collected and confined. And this is the most essential
“ part

“ part of our knowledge respecting the cause of this
 “ disease ; and even this little is disturbed with uncer-
 “ tainty : for we sometimes meet with instances of peo-
 “ ple of *robust constitutions*, who are seized with the dis-
 “ ease in all its malignity, when they are under no *de-*
 “ *pressing passion*, when the disease is *not epidemic*, to
 “ whom we cannot trace it from any place where the
 “ human effluvia could be confined in any uncommon
 “ degree, or from any person in the disease, of which
 “ perhaps there is no other person ill in the neighbour-
 “ hood for several miles round ; and, in short, when we
 “ cannot connect it with any of the causes supposed to
 “ be the sources of the distemper. On extraordinary
 “ occasions of this kind we have nothing for it but to
 “ suppose that, notwithstanding the apparent vigour of
 “ the patient, his body has been peculiarly predisposed
 “ to catch the infection, and that some contagion, not
 “ forcible enough to infect any other person, has by some
 “ means, unobserved, been conveyed to him ; or, if so
 “ many suppositions displease, we may suppose at once
 “ that there is in some cases a source of this fever which
 “ has not been suspected. For, although the numerous
 “ observations that have been made give us the strongest
 “ reason to think that human effluvia produce this dis-
 “ ease, we have no right to infer that it cannot arise also
 “ from some other source.”

To the same purpose I subjoin the very respectable
 opinion and testimony of Dr. Patrick Russell. “ In some
 “ epidemical distempers, the sudden alternations of the
 “ air have constant and manifest influence ; in others,
 “ though the influence of the air must be equally ad-
 “ mitted, it seems not to depend on sensible alteration
 “ or succession in the common properties of the at-
 “ mosphere, but on some *inexplicable* combination, some
 “ *occult, new, unknown* quality. Amongst epidemics of
 “ this last kind must be reckoned the plague.
 “ Should ever that state of the air, without the concur-
 “ rence of which the contagion of the pestilence never
 “ spreads, or ceases to act, be discovered, and ascer-
 “ tained by unequivocal marks, the dread of the plague,

A a

“ universally

“ universally prevalent, would be greatly diminished,
“ more effectual means of preservation would be found
“ out, and the application of them might safely be li-
“ mited to certain seasons.

“ Experience in Turkey, where, generally, no precau-
“ tions are taken in the times of pestilence, clearly evin-
“ ces, that, in a certain state of the air, a communication
“ with infected places may subsist without any material
“ consequence. The return of the plague at Aleppo
“ happens at irregular periods; the intervals are of con-
“ siderable, but unequal, length; and in those the com-
“ merce with Egypt, Constantinople and Smyrna re-
“ mains uninterrupted. In the intervals between 1744
“ 1760, and from 1762 to 1780, the plague raged se-
“ veral times in the places now mentioned, without affect-
“ ing Aleppo; and even in two or three years subse-
“ quent to 1762, though it was at Marash, as well as
“ other places not far distant, with which Aleppo has
“ continual intercourse, no instances were discovered of
“ communicated infection: if such happened, they must
“ have escaped my utmost vigilance; and the daily
“ exercise of my profession led me to be very much
“ among the natives of all ranks. At the same time I
“ have reason to suspect that infected families from some
“ of those places took refuge in Aleppo; and I know,
“ with certainty, that not only some merchants of that
“ city, who happened to be at Marash when the plague
“ broke out there, returned to their families in the sum-
“ mer of 1763, but that caravans of various merchandise
“ arrived in the course of the same summer.

“ I consider it therefore as an established fact in the
“ Levant, that commerce and intercourse with infected
“ towns is sometimes attended with no bad consequence.
“ The same thing may perhaps be asserted, without
“ restriction, of all countries; but till the signs indicat-
“ ing a pestilential constitution be ascertained, no parti-
“ cular year can be declared exempt from danger. Pre-
“ dictions founded on *planetary conjunctions* have been
“ long exploded; and signs derived from the known
“ properties and alterations of the air, are almost equally
“ fallacious.

“ fallacious. The seasons concomitant with plagues in
 “ England, as well as elsewhere, have been very dissimi-
 “ lar ; and the same visible concurrence, usually deemed
 “ pestilential, has often, in the revolution of years, been
 “ observed to return, in various countries, without pro-
 “ ducing the dreaded consequences. Upon the whole,
 “ from all I have been able to collect, the pestilential
 “ constitution seems hitherto to be known only from its
 “ effects ; *neither its approach nor its retreat can be predict-*
 “ *ed ; and its nature remains wrapped up in* MYSTERIOUS
 “ DARKNESS.”

Having thus seen, that, of the causes commonly as-
 signed for epidemical diseases, not one can be accounted
 certain and determinate, it now remains to consider one
 more, and that is

Contagion. Though this has been generally account-
 ed the same with *infection*, yet by some it has been rec-
 koned otherwise ; and indeed there seems to be a necessity
 for such a distinction : for, though we should prove,
 ever so clearly, that a disease once communicated to one
 person should from that person be communicated to ano-
 ther, yet the difficulty is to know from whence the first
 person had it. This source, if any such can be found,
 is what we may with the greatest propriety distinguish by
 the name of *contagion*, and is the sense in which it shall
 for the future be used in this treatise, the matter commu-
 nicated from one person to another being always called
infection. This indeed differs from what many celebrated
 physicians have said upon the subject ; but the distinc-
 tion certainly must exist. Dr. Cullen speaks rather in-
 distinctly upon the subject. “ We have supposed that
 “ *miasmata* are the cause of intermittents, and *contagious*
 “ the cause of continued fevers, strictly so named ; but
 “ we cannot with propriety employ these general terms.
 “ The notion of *contagion* properly implies a matter aris-
 “ ing from the body under disease, *miasma*, a matter
 “ arising from other substances. But, as the cause of
 “ continued fevers may arise from other substances than
 “ the human body, and may in such cases be called a
 “ *miasma*, and, as other *miasmata* also may produce con-
 “ tagious

“tagious disorders, it will be proper to distinguish the
 “cause of fevers by using the terms *marsh*, or *human ef-*
 “*fluvia*, rather than the general ones *miasma*, or *conta-*
 “*gion*.”

From this it is not very easy to determine what the Doctor means when he speaks of *specific contagion* as the cause of the plague. Dr. Ruffel plainly ascribes it to human effluvia. “The plague (says he) is a contagious disease ; that is, an *emanation from a body diseased*, passing into one which is sound, produces, in time, the “same disease,” &c. There must, however, undoubtedly have been something originally distinct from the human body which gave rise at least to the *first* plague that was in the world ; and some plagues recorded in history are said to have arisen in this way. Thus, Ammianus Marcellinus says that the plague which broke out in the Roman army in the time of Marcus Aurelius arose from a pestilential vapour confined in a golden coffer dedicated to Apollo. Upon opening this, the *contagion* diffused itself all around, and the *infection* spreading from one to another, produced an almost universal pestilence. Ammianus indeed is the only historian who relates this ; another account of its origin is given, p. 14, but whether we believe the account of Ammianus or not (which indeed does not appear probable) it is sufficient to show what were the received opinions at the time. In like manner every one has heard of pestilential effluvia breaking out from the earth, from graves, &c. so that we certainly look upon this doctrine of *contagion* as the cause of diseases to have been pretty generally received. We are also informed by Dr. Mead, from M. Villani, who wrote the history of those times, that the great plague of 1346 began in China, where, according to the report of some Genoese sailors, it was occasioned by a great ball of fire that either burst out of the earth, or fell down from heaven. This is thought incredible by Dr. Mead, and no doubt is so, but it shows the general opinion, that the original cause or *contagion* which produces a plague is distinct from the *infection* which is afterwards communicated from one to another. In the
 French

French Encyclopedie, we have this account of the ball of fire, or fiery vapour, without any comment.

As to the opinion of pestilential vapours arising out of the earth, though we are assured that people have been suddenly killed by explosions, probably of the electrical kind, or by lightning issuing from under their feet, yet we are not furnished with any well authenticated accounts of a *plague* having arisen from any such cause. About 19 years ago a violent fever raged epidemically through a small district in the north of Scotland, which was said to have originated in the following manner. Some young men having heard that a certain place in their neighbourhood had, in the time of a plague been a burial ground, took into their heads to dig into it. They did so, and one of them immediately fell sick, but recovered. The father of two of the young men, exceedingly displeased at the conduct of his sons, and apprehensive of the consequences, filled up the hole they had dug in the ground, soon after which he fell sick and died, and the fever continued to rage in the neighbourhood for some time. The mother of another of the parties concerned also died, and boils broke out on various parts of the bodies of the sick. This was the account given in some of the new-papers of the time, and had the matter been thoroughly investigated and attested, would have been decisive in favour of pestilential contagion being capable of taking up its residence in the earth. As it stands at present, it can only draw our attention to what may happen in another case, should any similar one occur.*

With

* Though the writer of this Treatise was not at that time on the spot where this event took place, yet he has as good evidence as any one can have of what has not fallen under his immediate inspection, that these graves were opened, that the father of one of the young men died; and the mother of another, and one of the young men himself was taken ill, with the eruption of boils on some parts of his body; but whether there was any person previously affected with fever in the neighbourhood from whom it might have been derived, or any thing which might have strongly predisposed those people to it is unknown. It is indeed no easy matter to discover who was the first person affected with an epidemic, as no body chooses to own that either they, or any of their relatives were the authors of mischief, however involuntary, to the community. M. Chaptal, however, in his Elements of Chemistry, has some curious, as well as useful observations on the propriety of burying bodies in a sufficient space and at a sufficient depth; and on the accidents which may arise

With regard to epidemics occasioned by the action of electricity, we cannot indeed produce any instance ; but we have one of a distemper more dreadful than even the plague itself ; and that is of a person suddenly struck by an electric flash (generated either in his own body, or in the room where he was) and by this stroke reduced to a most deplorable condition, which soon ended in death. The account stands on the authority of Mr. Joseph Battaglia, surgeon at Ponte Bosio, who transmitted it to Florence, and is as follows.

“ Don G. Maria Bertholi, a priest residing at mount Valere in the district of Livizzano, went to the fair of Filetto, on account of some business which he had to transact, and after spending the whole day in going about through the neighbouring country, in order to execute commissions, in the evening he walked towards Fenille, and stopped at the house of one of his brothers-in-law, who resided there. No sooner had he arrived, than he desired to be conducted to his apartment, where he put a handkerchief between his shoulders and his shirt, and, when every body retired, he began to repeat his breviary. A few minutes after, a loud noise was heard in Mr. Bertholi's chamber ; and his cries having alarmed the family, they hastened to
“ the

arise from opening vaults and burying grounds. An instance of this he gives of the ground of a church in Paris being dug up, which emitted a nauseous vapour, affecting several people in the neighbourhood.

From M. Chaptal's observations it appears, that bodies do not soon dissolve in such a manner as to emit no disagreeable or noxious effluvia, when buried. M. Becher, he says, “ had the courage to make observations during the course of a year upon the decomposition of a carcase in the open air. The first vapour which rises, he says, is subtle and nauseous : some days after, it has a certain sour and penetrating smell. After the first weeks the skin becomes covered with a down, and appears yellowish ; greenish spots are formed in various places, which afterwards become livid and black ; a thick glosey or mouldy substance then covers the greatest part of the body : the spots open and emit a sanies.” In such as are buried the decomposition is much more slow ; our author thinks *four times* at least. According to M. Petit, a body buried at the depth of four feet is not decomposed in less than three years, and, at a greater depth the decomposition is still more slow. This decomposition is favoured by the presence of water, and likewise by some kinds of earth more than others. It has been proved by Lemery, Geoffroy, and others, that argillaceous earths have very little effect in this way : porous and light earths much more : the roots of vegetables also by absorbing the putrid effluvia contribute greatly to the final decomposition of bodies buried in places exposed to the open air ; but in churches and other covered places the case is vastly different. “ Here, says our
“ authority

" the spot, where they found him extended on the floor,
 " and furrounded by a faint flame, which retired to a
 " greater distance in proportion as it was approached,
 " and at length disappeared entirely. Having conveyed
 " him to bed, such assistance as seemed necessary was
 " given him. Next morning I was called, and after
 " examining the patient carefully, I found that the tegu-
 " ments of the right arm were almost entirely detached
 " from the flesh, and hanging loose, as well as the skin
 " of the lower part of it. In the space contained be-
 " tween the shoulders and the thigh, the teguments were
 " as much injured as those of the right arm. The first
 " thing, therefore, to be done, was to take away those
 " pieces of skin ; and, perceiving that a mortification was
 " begun in that part of the right hand which had receiv-
 " ed the greatest hurt, I scarified it without loss of time ;
 " but notwithstanding this precaution, I found it next
 " day, as I had suspected the preceding evening, entirely
 " sphacelous. On my third visit, all the other wounded
 " parts appeared to be in the same condition. The pa-
 " tient complained of an ardent thirst, and was agitated
 " with dreadful convulsions. He voided by stool bili-
 " ous putrid matter, and was distressed by a continual
 " vomiting.

" author, is neither water nor vegetation ; and consequently no cause which
 " can carry away, dissolve or change the nature of the animal fluids : and
 " I cannot but applaud the wisdom of government which has prohibited the
 " burying in churches ; a practice which was once a subject of horror and in-
 " fection.

" The decomposition of a body in the bowels of the earth can never be dan-
 " gerous, provided it be buried at a sufficient depth, and that the grave be not
 " opened before its complete dissolution. The depth of the grave ought to be
 " such that the external air cannot penetrate it ; that the juices with which
 " the earth is impregnated may not be conveyed to its surface ; and that the
 " exhalations, vapours, or gases, which are developed or formed by decompo-
 " sition, should not be capable of forcing the earth covering which detains
 " them. The nature of the earth in which the grave is dug, influences all its
 " effects. If the stratum which covers the body be argillaceous, the depth of
 " the grave may be less, as this earth difficultly admits a passage to gas and
 " vapour ; but, in general, it is admitted to be necessary that bodies should be
 " buried at the depth of five feet to prevent all these unhappy accidents. It
 " is likewise necessary to attend to the circumstance, that a grave ought not to
 " be opened before the complete decomposition of the body. The term of de-
 " composition is various ; according to M. Petit of three years in graves of
 " four feet, and four years in those of six feet. The pernicious custom which
 " allows a single grave to families more or less numerous, ought therefore to
 " be suppressed ; for, in this case the same grave may be opened before the
 " time prescribed. It is likewise necessary, to prohibit burying in vaults, or
 " even in coffins."

“vomiting, accompanied with a violent fever and delirium. At length the fourth day after a comatose sleep of two hours, he expired. During my last visit, while he was sunk in the lethargic sleep of which I have spoken, I observed with astonishment, that putrefaction had already made so great progress, that his body exhaled an insupportable smell. I saw the worms which issued from it crawling on the bed, and the nails of his fingers drop of themselves; so that I thought it needless to attempt any thing farther, while he was in this deplorable condition. Having taken care to get every possible information from the patient himself, respecting what had happened to him, he told me, that he had felt a stroke, as if somebody had given him a blow over the right arm, with a large club, and that at the same time, he had seen a spark of fire attach itself to his shirt, which in a moment was reduced to ashes, though the fire did not in the least injure the wristbands. The handkerchief which he had placed upon his shoulders, between his shirt and his skin, was perfectly entire, without the least appearance of burning, his drawers were untouched, but his night-cap was destroyed, though a single hair of his head was not hurt. That this flame under the form of elementary fire, burnt the skin, reduced the shirt to ashes, and entirely consumed the night-cap, without in the least touching the hair, is a fact which I affirm to be true: besides, every symptom that appeared on the body of the deceased, announced severe burning. The night was calm, and the circumambient air very pure: no bituminous smell could be perceived in the chamber, nor was there the least trace of fire or of smoke. A lamp, however, which had been full of oil, was found dry, and the wick almost in ashes. We cannot reasonably suppose this fatal accident to have been occasioned by any external cause; and I have no doubt that if Maffei were still alive he would take advantage of it to support an opinion which he entertained, that lightning is sometimes kindled in the human body and destroys it.”

Another

Another account, to the same purpose, is given in Mr. Battaglia's paper. "On the 21st of April, 1781, the first battalion of the brigade of Savoy set out from Tortona, in order to go to Arti, when the weather was excessively hot. On the 22d, having made rather a forced march, the soldiers suffered a great deal from the ardour of the sun, so that, at the village of Serre, where they halted, one of them, named Bocquet, a man of twenty-five years of age, whose skin being very hard and thick had not perspired, sent forth a loud cry, which seemed to announce some extraordinary commotion, and instantly fell down. Mr. Bianet, surgeon major to the regiment, found the patient in convulsions. When he was carried to the hospital the upper part of his body, to the thighs, appeared to be withered and black, and in a gangrenous state. Mr. Bianet employed scarifications, but, without effect; it was impossible to make him swallow any thing; and it was found necessary to abandon him to his dismal fate. His body soon exhaled a putrid smell, and he died at the end of five hours. That his disorder might not be communicated to others, he was interred together with his clothes. Upon inquiry, after his death, it was found that this man was addicted to the constant use of spiritous liquors, and that he had even drank of them to excess upon the march."

Other instances there are, still more terrible, of people actually taking fire and being consumed to ashes by some internal cause; but, as nobody was present either at the beginning or during the continuance of these extraordinary inflammations, nothing certain can be said about them. That such things, however, have happened, is certain, of which one of the most remarkable instances is that of Signora Corn. Zangari, an Italian lady. She retired to her chamber in the evening somewhat indisposed, and in the morning was found in the middle of the room reduced to ashes, all except her face, legs, skull and three fingers. The stockings and shoes she had on were not burnt in the least. The ashes were

light, and on pressing them between the fingers vanished, leaving behind a gross, stinking moisture, with which the floor was smeared; the walls and furniture of the room being covered with a moist cineritious soot, which had not only stained the linen in the chests, but had penetrated into the closet, as well as into the room overhead, the walls of which were moistened with the same viscous humour. This lady had been accustomed to use a bath of camphorated spirit of wine when indisposed.

Dr. Zimmerman, from the 64th volume of the Philosophical Transactions, relates the case of a poor woman who perished in this miserable manner at Coventry in England in the year 1772. "She fell out of bed, "and was found next morning burnt to death, though "the fire in the grate had been small, and the furniture "in the room had suffered but little. Except one "thigh and leg, there were not the least remains of any "skin, vessels or viscera; and the greater part of the "bones were completely calcined, and covered with a "whitish efflorescence."

On these unfortunate people it has been observed that they were generally intemperate in the use of spiritous liquors. Of the poor woman at Coventry, whose case has been just now related, it is said, that she had been in the practice of drinking from half a pint to a quart of rum every day, and this she continued, notwithstanding her being affected with jaundice and other complaints. Mr. Wilmer, who communicated this case to the Royal Society, concludes it with these words: "That her "solids and fluids were rendered inflammable by the "immense quantity of spiritous liquors she had drank, "and when she was set fire to she was probably soon "reduced to ashes."

On other cases of a similar nature it has been remarked, that the miserable sufferers were "for the most "part advanced in years, remarkably fat, and had been "much addicted to the use of spiritous liquors, either "in their drink, or applied in friction to the body; "whence it has been concluded that these people per-
"rished

“rished by their whole substance spontaneously taking
“fire, the principal seat of which had been the entrails,
“or the epigastric viscera ; and that the exciting cause
“was naturally found in the phlogiston of the hu-
“mours, called forth by that of the spiritous liquors
“combined with them.”* But solutions of this kind
cannot by any means be admitted. We have not the
smallest reason to think that either the solid or fluid
parts of the bodies of hard drinkers are more inflammable
than those of other people ; neither is it credible that
any person could live with his body in such a state. Be-
sides, the most inflammable bodies will not begin to
burn unless fire actually be applied to them, while others
much less inflammable to appearance, will yet take fire
spontaneously. Thus, even spiritous liquors themselves,
though they flame violently when thrown into a fire, or
when a burning body is applied to them, yet there is
not an instance of such liquors taking fire of themselves ;
nay, they cannot even be set on fire by pouring them up-
on a red-hot iron, while, on the other hand, heaps of
wet vegetables, which we should think scarce at all in-
flammable, do yet very frequently take fire spontaneously.
The author lately quoted, however, justly observes that
M. Bartholi, the unfortunate priest above mentioned was
plainly struck first by electricity from without, a spark of
fire attaching itself to his shirt, and a faint flame surround-
ing his body ; so that the fire did not seem to have
been generated in his body, but in the atmosphere.
There are instances of people being surrounded with these
luminous appearances without being hurt ; particularly
of a woman at Milan, whose bed was surrounded with
a light of this kind. Mr. Loammi Baldwin, of this
country, was also surrounded by an electric light, while
raising a kite in the time of a thunder storm, and Dr.
Priestley makes mention of a gentleman, who, after hav-
ing worked an electric machine for a long time in a
small room, perceived, on leaving it, a luminous vapour
following him. But the instances most to our present
purpose are some recorded in the Philosophical Transac-
tions,

* American Museum, vol. xi, p. 148.

tions, of luminous vapours coming from the sea, attaching themselves to corn-stacks, and setting fire to them. One of this kind is particularly mentioned in Lowthorp's *Abridgement of the Transactions*, as having taken place in Ireland, coming repeatedly from the sea, and setting fire to corn and hay, so that the people were greatly alarmed. At last they found that it might be driven off by making a great noise, and that it would avoid any sharp-pointed iron instrument. Had such a vapour attached itself to a human body, it is possible that it might have set fire to it as well as to the stack of corn or hay. Whether these accounts render the story of the Genoese sailors concerning the ball of fire occasioning the plague of 1346 more credible, we leave the reader to judge. They certainly show, however, that the electric fluid will sometimes interfere with the human body in a very terrible manner, producing, where it does not kill instantaneously, symptoms equal to those of the very worst plague, as in the case of the priest and soldier above mentioned.

Another hypothesis concerning the origin of pestilential diseases is that of swarms of little animals invisibly existing in the atmosphere ; which, being taken into the body by the breath, are supposed to corrupt or otherwise vitiate the blood and other parts of the body, as we see in the plague and other epidemic disorders. This hypothesis, so generally exploded, and so apparently improbable, seems to receive some support from a discovery of an insect made by Mr. Henry Baker, F. R. S. and published in his work entitled "*The Microscope made Easy*." He called it the insect with net-like arms. " It lives (says he) only in cascades, where the water runs very swift. Some of them being kept in a vial of water, most died in two days, and the rest, having spun themselves transparent cases, which were fastened either to the sides of the glass, or to pieces of grass put into it, seemed to be changed into a kind of chrysalis ; but before they assumed this form, they altered their shape (in a manner he represents by a figure.) None of them lived above three days ; and, though fresh water was
" given

“given them two or three times a day, yet in a few hours
“it would stink to a degree scarce conceivable, and that
“too at several yards distance, though, in proportion to the
“water, all the included insects were not more than as
“one to one million, an hundred and fifty thousand. This
“makes it probable that it is necessary for them to live
“in a rapid stream, lest they should be poisoned by the
“effluvia issuing from their own bodies, as no doubt
“they were in the vial.”

From this account it is not difficult to conceive that animals, though exceedingly small, may yet emit such poisonous effluvia as will destroy much larger ones in their neighbourhood. It will by no means be incredible that, had one or two such offensive animals been thrown into a jar containing gold-fishes,* the whole of these beautiful inhabitants would have perished at once. Let us suppose such a thing to have actually happened; that a malicious person had put them in over night, and in the morning the proprietor of the fishes finds them all dead, and the water offensive to the last degree. He sends for a neighbouring philosopher, who, happening to be ignorant of the existence of such animals, endeavours to account for the phenomenon upon some of the received principles of philosophy. How much theory would here be wasted, and what endless disputes might ensue without even a *possibility* of arriving at the truth! Just so it is with epidemic diseases. The cause is invisible, and, until it becomes discoverable by our senses, it can never be known; for, as has already been observed, a cause never can be known merely by its effects, unless we have seen it, or somebody who has seen it gives us information. And this will certainly be found to hold good in every instance, even from the Supreme Cause himself to the diminutive insect just mentioned.

Lastly, I shall consider another *possible* source of epidemics, which has been hinted at by others. Allowing
that

* The gold-fish is a small species of carp, brought originally from China. They are adorned with the most beautiful and resplendent colours, and are frequently kept in jars for pleasure. They subsist entirely on the water, without any other food. This is by Dr. Fordyce said to be the case with all fishes, provided the water be impregnated with oxygen.

that infectious matter proceeds from the body of a diseased person, as much must issue from a single patient as is sufficient to bring the disease upon thousands, and with regard to the small-pox and some other distempers we certainly know that it is so. This infection is diffused in the atmosphere, and intimately combined with it, so that it becomes imperceptible and harmless; but we have no reason to suppose that it is annihilated, or cannot be re-produced in its pristine state. Water, though perfectly dissolved, and to appearance deprived of existence in the air, may yet be precipitated from it, and pour down upon us in deluges. What happens in one case may happen in another. The infectious matter, dissolved in the air, may by some natural cause be precipitated from it, overshadowing whole regions, and, if it be not powerful enough to produce the epidemic of itself, may certainly *predispose* to it in such a degree, that the slightest additional cause will bring it on.

Something indeed of this kind would seem really to be the case, otherwise we cannot well conceive why there should be such a distinction of diseases. Thus the infection of the small-pox is the same all over the world. The variolous matter will never produce the measles in any country, nor will the typhus produce a pleurisy. The plague manifests itself to be the same distemper in all its various degrees of malignity, though even this dreadful disease is sometimes so mild that it does not confine the patient to his bed. There must therefore be some certain constitution in the nature of the cause which produces such and such diseases, as certainly as in the seed of particular vegetables, which gives to each its proper appearance and shape. The cause of the disease so modified we may call, with Dr. Cullen, its *specific contagion*.

Having thus treated so largely upon contagion of different kinds, it now remains to consider the objections that have been made to the doctrine altogether. It is indeed surprising that in so great a length of time, after the world hath so often and so dreadfully suffered from the violence of plagues, the simple fact, whether it be
infectious

infectious or not, should not have been determined : nay, that it should still be questioned by physicians of no mean reputation whether such a thing as contagion or infection *can possibly exist*. Dr. Mosely in his treatise on tropical diseases treats the whole doctrine of contagion with the utmost contempt ; calling it “ a field for speculation, which has long amused the pedantry of the schools, and should never be entered into by practical writers.” Notwithstanding this, however, he doth enter into it, and with such bad success, that in the very first paragraph he is obliged to derive the cause of diseases from the stars ! “ There are some diseases we know, (says he) which follow the changes of the atmosphere ; but there are others which make their revolutions, and visit the earth, at uncertain periods ; for which we can trace no cause, depending on combinations, in which, perhaps, the *influence of the planets* may have some share.” Here we have a still wider field for speculation than even *the schools* have given us ; for the Doctor ought to remember that the influence of a *planet*, producing a disease, is as truly contagion as the effluvia of a *dunghill* ; and if we have a wide field to traverse when tracing it through the earth, we have one infinitely more extensive in pursuing it through the heavens. But we may be assured that planetary influence *does not* produce diseases ; for, if it did, they would in all times of pestilence overspread the face of the earth, as the influence of the planets, if they have any, certainly does.

The arguments used by this author against *terrestrial* contagion are,

1. “ It has often happened that hundreds of men in a camp have been seized with the dysentery, almost at the same time, after one shower of rain, &c. People under similar circumstances must be subject to similar diseases : and yet it often happens that dysentery begins with a few people, and spreads itself by degrees until a multitude are affected.”

This argument rather militates against himself ; for, if dysentery or any other disease was occasioned by an
evident

evident general cause operating upon persons in similar circumstances, all of them ought to be taken ill at once; but Dr. Mosely owns that they frequently are not. There must, of consequence, be something *less evident* which determines the disease to particular persons, while the general cause operates equally upon all. This *less evident* cause we call *contagion*.

2. "It is incredible that the smelling a little human blood, that had stood some months in a phial, gave the man a dysentery mentioned by Pringle; or that the person Forestus speaks of got the plague by only putting his hand into an old trunk; or that the shaking an old feather-bed, which had lain by seven years, raised a plague at *Wratisslau*, which destroyed five thousand persons in twelve weeks, as related by Alexander Benedictus, &c.—Such things *may be true*, but, when probability is shaken, reason always inclines to skepticism."

Here our author most evidently contradicts himself; for in the beginning of the paragraph he tells us that the things related are *incredible*, and in the end of it, that they *may be true*. The argument, if it may be so called, is mere assertion. It is *incredible* that the smell of putrid human blood in a vial should produce the dysentery. Why should this be more incredible than that smelling to a charged vial should ensure an electric shock to the person who did so? This is entirely a question respecting a matter of fact, not of speculation. The same is the case with the rest. It is not more incredible that, if the infection of the *plague* was in a trunk, a man should get the plague by putting his hand in it, than that he should be burnt if he put his hand into a trunk full of hot ashes. Before the Doctor decided in such a positive manner, he ought to have proved that no infection could be contained in a trunk; but this, though the very point in question, he takes for granted, first telling us that the contrary is incredible, and then that it may be true!

3. "We observe in camps and hospitals, that those people *whose dirty employments* subject them in a particular manner to a *depravation of their habits*, seldom
"escape

“escape the present epidemic ; and this gives rise to the
 “vulgar expression, and very incorrect notion, of *catching*
 “the disease. And we observe that others from the
 “slightest deviation from regularity lose the power by
 “which the body resists diseases, and they are also at-
 “tacked. But these attacks are not to be attributed to
 “infection : for those people who keep the vital and
 “animal powers in uniform confederacy, by temperance
 “and calmness of mind (for fear, by lowering the vital
 “energy, subjects the body to disease) nourishing diet,
 “proper clothing and cleanliness, and keeping a free and
 “regular passage for all excretions, are proof against the
 “assaults of foul and pestilential air. Such people sel-
 “dom suffer even by the plague itself : while all around
 “them perish.”

The first sentence of the above paragraph is so ob-
 scurely worded, that it is difficult to know the author's
 meaning. I know not of any lawful employment so *dirty*
 that it necessarily subjects the person who practises it to
 a *depravation of habit*. The next ascribes every thing
 to intemperance and fear ; from which, it seems, we are
 to infer that none but drunkards, cowards, and dirty,
 naked ragamuffins, are ever seized with epidemic diseases.
 But of this we are able to bring a direct disproof. I sup-
 pose Dr. Mosely will not say that the celebrated Prince
 Eugene of Savoy was either a coward or a drunkard ;
 that he had a *dirty employment*, wanted proper food or
 clothes, or was deficient in personal cleanliness ; yet,
 when in the marshy parts of Hungary, he was in danger
 of death from an epidemic dysentery, notwithstanding
 that he was so careful in respect of diet, that he had
 pure water brought him every day, probably from a
 considerable distance. How came he to be affected by
 the distemper under such circumstances, while Count
 Boneval, though as an inferior officer he probably enjoy-
 ed fewer advantages, remained free from it, taking only
 a small quantity of Peruvian bark daily ? It is uncertain
 whether the bark did really preserve him or not ; but
 the case of Prince Eugene plainly shows that sobriety,
 temperance, valour and cleanliness are not sufficient to

ward off an epidemic disease, if people come in the way of infection.

4. " It should follow, if contagion were supported by infected bodies, that no person should ever escape infection (as at Oxford assizes in 1577*) who was within the sphere of its action; and that those who were entirely secluded from it, and free from all contiguity to infected people, or substances, as the collegers were in the town of Cambridge, when the plague was last in England, should be exempt from it.

" But, in opposition to this, *Rhazes* lived 120 years, and often practised in plagues. *Hodges* remained in town, and attended the sick, during the great plague in 1665. *Kaye* was in the midst of practice in the sweating sickness in 1551, without any inconveniency. *Procopius* informs us, that during a terrible plague at Constantinople, in 543, which almost destroyed the whole city, no physician nor other person got the plague by attending, dressing or touching the sick.

" Yet

* Sir John Pringle, from Stowe's Chronicle, gives the following account of these assizes. " On the 4th, 5th and 6th days of July were the assizes held at Oxon, where was arraigned and condemned Rowland Jenkins, for a seditious tongue; at which time there arose amidst the people such a damp, that almost all were smothered. Very few escaped that were not taken. Here died in Oxon three hundred persons; and sickened there, but died in other places, two hundred and odd.

" The sessions at the Old Bailey in Westminster, in 1650, proved also fatal to many; of which Sir John also gives an account. " I have been informed (says he) that, at those Sessions, about a hundred were tried, who were all kept in close places as long as the court sat; and that each room was but 14 feet by 11, and seven feet high. The bail-dock is also a small room taken off one of the corners of the court, and left open at the top: in this, during the trials, are put some of the malefactors who have been under the closest confinement. The hall in the Old Bailey is a room of only 30 feet square. Now whether the air was most tainted from the bar by some prisoners then ill of the jail distemper, or by the general uncleanness of such persons, is uncertain; but it is probable that both causes concurred. And we may easily conceive how much it might have been vitiated by the foul steams of the bail-dock, and of the two rooms opening into the court in which the prisoners were the whole day crowded together till they were brought out to be tried. It appeared afterwards, that these places had not been cleaned for some years. The poisonous quality of the air was aggravated by the heat and closeness of the court, and by the perspirable matter of a number of people of all sorts, penned up for the most part of the day, without breathing the free air, or receiving any refreshment. The bench consisted of six persons, whereof four died, together with two or three of the counsel, one of the under sheriffs, several of the Middlesex jury, and others present to the amount of above forty; without making allowance for those of a lower rank, whose death may not have been heard of; and without including any that did not sicken within a fortnight after the sessions."

(Pringle's Observations p. 329 & seq.)

“ Yet most of the Capuchins, the Jesuits, the Recollets,
“ the Observantines, the Barefooted Carmelites, the
“ Reformed Augustines, all the Grand Carmelites, the
“ Grand Trinitarians, the Reformed Trinitarians, the
“ Monks of Loretto, of Mercy, the Dominicans, and
“ Grand Augustines, who kept themselves secluded in
“ their several convents, and took every precaution to
“ avoid the plague, while it raged at Marseilles, perished
“ by it.

“ There are no epidemical nor contagious diseases
“ that attack every person who breathes the same air,
“ or that is in contact with the infection, else whole
“ regions would be depopulated. The habit must be
“ graduated, or adapted, for the reception of a disease.
“ In some constitutions of body the access is easy, in
“ some difficult, in others impossible. *But where the*
“ *revelation of this mystery is to be found, none can tell.*”

In this, which our author seems to have designed as his *grand argument*, it is plain that the deficiency is as great as in any of the rest. If we suppose the plague, or any other epidemic disease, to arise from some general cause, let that cause be *contagion* or any thing else, it ought to operate upon all who come within its sphere of action, as Dr. Mosely observes of *infection*. If experience shows that it does not, the argument will hold equally against a constitution of the atmosphere, putrid effluvia, heat, cold, or any thing else; and in fact the Doctor fairly gives up the point at last, by resolving the whole into an *unrevealed* mystery. With regard to what he says about the plague at Marseilles getting into the convents, of which he presents us with such a catalogue, it is impossible to know what precautions were used, and we are assured that in Turkey it is thought necessary for the Europeans not only to guard against a communication with their own species, but some of the brute creation also. Cats particularly are dreaded so much, that a general massacre of them commences among those who use precautions, the favourites of that species must be sent to a distance, and M. Volney mentions two merchants who had shut up their houses, and yet had the plague

plague imported by a cat. In short, considering that infection is supposed to be altogether invisible and imperceptible, it is impossible to say how it may be conveyed, or to what extent it may occasionally act when once brought into a country. Dr. Fordyce is of opinion that the distance at which infection may act depends on the disposition of the air at the time; and he observes, that a difference in this respect is observable in the odoriferous effluvia of vegetables. "If the air be loaded with moisture, they reach to a much greater distance. Vapour arising from a field of beans, for instance, or a putrid ditch, is sensible to the nostrils at a greater distance if the air is moist." He observes indeed that this has never been verified with regard to infection; but as it is evidently the case with putrid effluvia, which very often accompany infection, we may reasonably conclude that it is the case with the latter also.

Let us next take a view of what is advanced by the authors of *The Science of Life* upon this subject. Mr. M'Lean, who puts his name to this part, informs us of his conviction "that no general disease, which affects a person more than once during life, can ever be communicated by contagion;" and he defines contagion "a specific matter, generated in a person affected with disease, and capable of communicating that particular disease, with or without contact, to another." It would here be no improper question, by what means he comes to know that a contagious disease can affect a person only *once*. But even this question is unnecessary. Dr. Guthrie gives an account of a gentleman who had the courage to inoculate himself for the plague, in consequence of which he had the disease with the concomitant symptoms of buboes, &c. Here then we see the plague communicated by "a specific matter generated in a person affected" with the same disease, i. e. by *contagion*, according to Mr. M'Lean's own definition. The dispute therefore might stop, as this fact seems to be decisive on the subject; but as he has at great length insisted upon the argument last quoted from Dr. Mosely, it seems necessary to follow him a little farther.

“ If a person (says our author) be affected with any
 “ disease, it will necessarily be communicated to every
 “ other person who comes within the infectious distance,
 “ and is not at the same time labouring under some disease
 “ higher in degree. This proceeds upon a supposition
 that his theory is absolutely perfect and infallible ; which,
 however plain it may appear to himself, will not proba-
 bly be admitted by others without some proof. Indeed
 he himself afterwards adduces some facts which decisively
 overthrow it. “ A child (says he) here and there is
 “ exempted from small-pox, even though exposed to
 “ its contagion.” How comes this to pass ? The disease,
 we are told, is contagious, the child is exposed to the con-
 tagion, and yet is not affected. In *all* such cases it would
 be ridiculous to suppose the subjects labouring under a
 disease higher in degree than the contagion could pro-
 duce. In numbers of instances of this kind the children
 were evidently in good health, and yet would perhaps be
 seized at an after period when no more exposed to conta-
 gion than they had been at first.

“ Small-pox, measles, and other general diseases, which
 “ occur only once during life, never disappear, until *the*
 “ *whole* of those who have been within the infectious
 “ distance, and were not at the time labouring under
 “ some disease higher in degree, have received the infec-
 “ tion. As these diseases are *very mild*, children some-
 “ times resist the power of contagion from the superior
 “ force of some other diseases, although they may be so
 “ slight as to escape *common* observation.”

In this paragraph we have the favourite maxim of our
 author repeated, *twice* indeed, without a single fact to
 support it. Instead of this we find hypothesis heaped
 upon hypothesis, as the giants are said to have heaped
 mountains upon one another in order to get up to hea-
 ven. He first supposes that the infection of the small-
 pox seizes on *the whole* of those on whom it falls. The
 exceptions to this maxim he explains by another *suppo-*
sition, viz. that the contagion of the small-pox is coun-
 teracted by another disease. The second hypothesis is
 supported by a third, and that a very extraordinary one,
 that

that the small-pox (a disease which has destroyed innumerable multitudes) is *very mild* ; and this third by a fourth, that the diseases which counteracted the contagion were so slight as to escape *common* observation. It was incumbent on Mr. M'Lean to have pointed out some of those diseases, and to have informed us how they came to counteract this contagion. But it is needless to argue with one who writes so extravagantly. Far from the mode of reasoning followed by Dr. Fordyce, who decided from the majority of facts, our author determines every thing by his own preconceived opinions. " That the power which occasioned disease at the Oxford affizes (says he) was not contagious matter, is " proved by its producing diarrhœa in some, while it " produced fevers in others." But, if it was not contagious matter, what kind of matter was it ? Or how comes our author to know that those who were affected by the diarrhœa were not likewise affected by fever ? How many fevers are attended by diarrhœa, or how many cease when diarrhœa comes on ! It would have been equally conclusive to say that the matter was not contagious, because some died and some recovered.

I shall only take notice of one assertion more, it being both tedious and unnecessary to follow him through the whole. " From *every* record of epidemic and pestilential diseases, it would appear, that they have their stated " periods of recurrence ; that these periods are such " months as are most remarkable for vicissitudes of the " atmosphere ; that they become general only in those " years in which these vicissitudes are extreme ; that " they do not occur in seasons when the heats or colds, " however intense, are equable ; nor in years when the " state of the atmosphere is tempered throughout ; and " that they uniformly cease with the establishment of " an equable state of the atmosphere, whether the weather be cold or hot. . . . In Aleppo, according to Dr. " Ruffel, the Europeans regularly shut themselves up in " their houses *every year*, at some period between April " and July ; and the rich natives begin to adopt the " same plan, &c. . . . From this fact it appears, that " the

“ the plague occurs at Aleppo, in a state more or less
“ mild, almost annually, and *that it commences and ceases*
“ *at certain known periods.* But it has been remarked
“ that, in its most severe state, this disease recurs only at
“ periods of ten years, or *thereabouts* : a regularity which
“ cannot, upon any known principle, be attributed to a
“ power of such casual application as contagious mat-
“ ter.”

In the beginning of this paragraph our author makes a bold appeal to *every* record of epidemic and pestilential disorders ; but here we may ask, Has he consulted *every* record of these disorders ? That he has not, we may readily believe ; but even those which are hinted at seem either to have been very inaccurately consulted, or wilfully misrepresented. To evince this I subjoin the following abstract of what Dr. Alexander Ruffel says of the plague in general, with the annotations of his brother, Dr. Patrick, taken from Ruffel's Natural History of Aleppo.

The inhabitants of Aleppo suppose that the plague visits them once in ten years, and that it is always imported ; and the most severe plagues are thought by some to come from Damascus, while others contend that they come from the northward. Dr. Alexander Ruffel thinks this popular opinion of the return of the plague not altogether unfounded ; and he thinks it also probable that it never invades Aleppo without having previously attacked either Damascus or Khillis, Aintab, Marash or Uusa. He thinks that its appearance always is in one of the maritime towns of Syria ; if in Sidon, Byroot or Tripoli, Damascus is commonly the channel by which it reaches Aleppo ; but, if it shows itself first at Scanderoon or Byass, its approach is by the way of Khillis or Aintab.

On this Dr. Patrick Ruffel observes, that the account of Aleppo being visited only once in ten or twelve years is confirmed by a letter from an English gentleman, in 1719, who had resided there for 30 years. The dates of the plagues which Dr. Patrick had procured were, 1719, 1729 and 1733. Another began in 1742, and terminated

terminated in 1744; from which time there was no return till 1757 or 1758, when it continued at Aleppo till 1762, and did not entirely quit the country till 1764. The plague of 1719 was said to come from the northward, but this appeared to want confirmation; but all accounts agree that it raged at Tripoli, Sidon, &c. two months before it appeared in Aleppo. Egypt was ravaged by the plague in 1728, as was also Byass and the neighbouring parts in the same summer; and next year it appeared at Aleppo. In 1732 it raged at Sidon, Tripoli and Damascus; next year it seized Aleppo.

Dr. Alexander goes on to inform us, that the disease never spreads much in winter. It advances with the spring, comes to its height in June, declines in July, and terminates in August. "None (he says) are ever seized with in September and October, not even in the plague of 1742, which returned three years successively;" but Dr. Patrick says that this was not confirmed by his experience in 1760, though he owns that the distemper declines remarkably at that period; and the natives are greatly inclined to have it believed that the distemper has totally ceased, and to deceive the Europeans in this respect. The times at which the Europeans shut up and come out of their confinement show only the increase or decrease of the disease, but not its beginning or ending. The plague of 1719 made terrible havoc. Europeans then shut up about the middle of March, and kept confined till the middle of July. In 1729 they did not shut up till the middle of May, and were not confined above a month, the number of sick being small. In 1733 they were confined from the middle of March to the middle of July, but the distemper was less violent than in 1719. In 1742 the time of confinement much as in 1729. In 1743 shut up April 11, and opened the middle of July. The plague violent, but less so than in 1733. In 1744 few shut up, the number of sick being inconsiderable. In 1760 they shut up on the 30th of June, and continued about a month. In 1761 shut up May 28, rode out Aug. 1, and opened completely the 10th of that month. In

1762 they were confined from the last week in May to the first of August. From 1762 to 1787, a larger period than usual, the city was free from the plague. In 1787 it broke out among the Jews in the month of April, increased in May, raged violently in June, and terminated in July.

From these accounts it appears, as Dr. Alexander Ruffel informs us, that the plague of one year differs remarkably from that of another; but he says, that, at Aleppo, it is never attended with such scenes of horror as have been known in European countries; for which Dr. Patrick assigns the following reasons: 1. The markets are constantly supplied with provisions. 2. The dread of the contagion is much less. 3. The sick are less liable to be deserted by their attendants (but this, according to his own observation, is not always the case) and 4. The regular, speedy interment of the dead prevents a spectacle far from uncommon in the European plagues, and which of all others is the most shocking to humanity.

“Extreme heat (says Dr. Alexander) seems to check the progress of the distemper. July is a hotter month than June, and the season wherein the plague ceases at Aleppo is that in which the heats are most excessive.” His experience did not confirm a popular opinion at Aleppo, and which has likewise been adopted by many medical writers, that the moon has any influence on the distemper. To have had the distemper once does not secure a person against future attacks. Numbers of people who were alive when he left Aleppo had it twice or oftener; and he had instances of some being infected thrice in one season. Dr. Patrick Ruffel has observations to the same purpose.

From this it appears, that the popular opinion at Aleppo, which Mr. M'Lean wishes to establish as a certainty, is by no means so well founded that we can build any theory upon it. The misfortune is, that, wherever a theory is built upon any thing said to be constant and invariable, a single failure overturns the whole. Now, in the dates of plagues above mentioned, the variations are so great that it is impossible to draw any certain

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conclusion

conclusion from them. In the first three instances of 1719, 1729 and 1733 there is indeed a coincidence of the first two, but the last falls short by no less than *six* years. What then does Mr. M'Lean mean by his "ten years, or *thereabouts*?" Can *thereabouts* imply a difference of more than half? The English gentleman's testimony who resided 30 years in that country could extend no further than to three plagues, and even these are not mentioned. The fourth instance in 1742 is deficient in one year; the fifth in 1757 or 1758 exceeds by three or four years, and the sixth from 1762 to 1787 by no less than fifteen years.

An anonymous writer in a Scots periodical publication entitled "The Bee," has partly adopted the above opinion, but adds others for which he has not thought proper to adduce any authority. "It visits *most parts* of *Asia* once in ten or twelve years, and carries off an eighth or tenth of the inhabitants. There have been plagues which have carried off one fourth of the inhabitants. The farther east you go, the less frequent it is—every 20th, 40th, and, even at Bassorah, every 90th year; but then this scourge is most dreadful. The last plague at Bassorah, which had not visited the city for 96 years, carried off more than nine tenths of the inhabitants."* It is astonishing that people will write in such a manner as to subject themselves to endless criticism on account of their inconsistency. The plague, this writer says, visits *most parts* of Asia once every ten or twelve years, and yet it goes no farther east than Bassorah; a space scarce equivalent to the twentieth part of Asia! Even in this small space, it varies from ten or twelve, to twenty, forty, or even ninety years; and, to complete the whole, instead of giving any instance of the periodical return of the plague at an interval of *ninety* years, we have one of its disappearance for *ninety-six* years!

From all this it is evident, that no dependence can be placed on such vague accounts with regard to the periodical returns of the plague. Even the time of shutting up

* Bee, vol. xviii, p. 232.

up the houses in Aleppo is not accurately related, for, from the above abstract it is plain, that they are sometimes shut up in March ; while Mr. M'Lean would have us to believe that it is always between April and July. It is needless to wade through a jumble of unsupported assertions, which, being backed by no evidence, fall to the ground of themselves. " I will venture to assert (says he) that no person in perfect health ever " was or *can be* exposed to the power of contagion, without receiving the specific disease which that contagion produces ; excepting in small-pox, measles, &c. " when the person has previously had the disease."—How comes he to know all this ? Or, though our author ventures to assert, must we of necessity *venture to believe* ? When he ascribes the origin of epidemics, and the plague itself, to the vicissitudes of the atmosphere, not a single fact is adduced in support of his hypothesis. One very strange proof indeed he brings from Dr. Rush, viz. that the latter had been informed by a gentleman who resided in tropical countries, that, in the month of July, several weeks before the yellow fever became general, he had observed a peculiar and universal fallowness of complexion in the countenances of the people of Philadelphia, such as he had seen in those of the more southern countries before the appearance of bilious fevers in them. Surely it is a very strange mode of argument to tell us of the colour of people's countenances instead of the states or vicissitudes of the atmosphere, which we are made to believe were the causes of that change. Another quotation is made from the same author in which a warm, dry, stagnating air is *conjectured* to have been the cause of *diseases* ; but he does not even quote Dr. Rush saying that it was the cause of yellow fever, much less of all epidemic diseases. Besides, to say that any thing is occasioned by a *state*, or *vicissitude* of the atmosphere, is such a vague mode of expression, that it must either mean nothing, or be contradictory to itself. A *state* of the atmosphere we must suppose to mean that it continues for some time either to be wet or dry ; a *vicissitude*, when it changes from one to the other. If an epidemic

epidemic then is produced by a *state*, it cannot also be produced by a *vicissitude*, of the atmosphere: or, if some epidemics are produced by states, and others by vicissitudes, we ought to be informed which produce one kind, and which another. But throughout the whole of this dissertation we have neither distinctness nor regularity, nor indeed any thing but assertion, supported only by an imaginary theory.

Dismissing at length therefore these conjectural theories, let us endeavour to deduce from certain and undoubted facts the connexion between the state of the body, and the operations upon it of other causes, invisible indeed to our eyes, but discoverable by our rational faculties, and in some measure capable of being made the objects of our senses also.

1. From the account given of the structure of the human body, it undeniably follows, and has already been observed, that all parts of it are so connected together, that none can suffer any very grievous injury without affecting all the rest.

2. The life of man depends immediately on the air. From this element the *blood* receives heat and a vital spirit diffusing itself from the blood along the nerves, and thence expended in the operations of life and sensation.

3. From undoubted experiments* it appears, that this vital spirit possesses in a great degree the properties of electricity, insomuch that many suppose them to be the same. This is indeed denied by the celebrated anatomist, Dr. Monro, but he allows that the nervous fluid is similar to electricity, and it is certain that the electrical fluid can affect it in such a manner that we may reasonably believe them to be the same.

4. The air acts upon the blood by the *latent* heat it contains. The air itself is composed of something volatilised by heat. In some cases this is evidently a terrestrial substance, as in that of inflammable air, or hydrogen, which is formed of charcoal volatilised by heat, with the addition of a little water. In the case of oxygen,

* Those of Galvani and others on *animal electricity*.

oxygen, or dephlogisticated air, the combination seems to be the matter of heat (which I shall hereafter distinguish by the name of the *ethereal fluid*) with water deprived of its carbonic principle. This coincides with the opinion of Dr. Priestley, who says that the basis of dephlogisticated air seems to be *dephlogisticated water*. But, let the basis be what it will, the ethereal fluid which volatilises it is the *agent*; the basis is entirely *passive*, and only modifies or restrains the action of the other fluid, so that it does not exert itself except in particular cases. Fixed air, or carbonic acid, is composed of the base of oxygen united with a certain portion of carbon, and the whole volatilised by the ethereal fluid. Phlogisticated air, azote, or septon, according to Dr. Priestley, consists of the basis of dephlogisticated air along with a certain proportion of carbon different from that which produces fixed air, volatilised by the same agent;* and so we may determine concerning every other species of air.

5. In certain cases the ethereal fluid quits those substances with which it is united: the air is then decomposed, the substance into which the other fluid enters is heated, or rendered more fluid than before (perhaps both) while the basis either unites itself to the moisture of the lungs, or is thrown out by the breath. Whether in any case the basis can pervade the membranes, and thus mix itself with the blood, notwithstanding the positive assertions of Dr. Girtanner and others, is very doubtful, and does not admit of any positive proof.

6. The blood, being a *fluid*, must be subject to the same laws with other fluids. A certain quantity of *latent* heat must be contained in it, in order to give the degree of fluidity naturally belonging to it. If this quantity be augmented, the fluidity will be augmented, and the blood will become thinner; if it be diminished, the contrary will take place; and if we suppose a great proportion of this latent heat to be abstracted, it is not unreasonable to suppose that something like a congelation may take place, and the blood be changed into a solid substance of such a nature as cannot any more be made to resume its former qualities.

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* See Medical Repository, vol ii, No. iii.

7. By augmenting the sensible heat, the blood is affected in the same manner as any other fluid ; it suffers expansion, by which the vessels are dilated in proportion, and, if this expansion and dilation be carried to a certain length, a rupture of many of the small vessels, and apoplexy, or some other grievous disease, may ensue.

8. By breathing certain kinds of air, the fluidity, heat and expansion of the blood, and of consequence the dilation of the blood-vessels, are affected. Thus, when a person breathes a quantity of the fume of charcoal, containing much fixed air, he feels himself affected with pain and a sensation of fulness in his head ; he becomes sleepy, and, if the quantity be sufficiently great, he falls into an apoplexy, and dies. From dissections it appears that such as die in this manner have the capillary vessels greatly distended, and even ruptured ; the heat of the body is vastly augmented, and even continues some time after death. Hence it is evident, that, by breathing this kind of air, too much *sensible* heat is conveyed to the blood. In like manner when we breathe the steam of water, if any quantity of that steam be condensed in the lungs, the whole quantity of latent heat contained in that steam discharges itself upon the lungs, and increases the sensible heat of the body ; and from this we may learn why on some occasions our sensations should so ill correspond with the thermometer, and why a warm air almost saturated with moisture should always appear much hotter than a dry one, though the thermometer stand at an equal height in both. Oxygen air seems to convey to the blood a much larger quantity of what we have called *vital spirit*, than any other kind. Whether this vital spirit be the same with the latent heat of the blood, we know not ; but, as this kind of air is evidently capable of supplying the blood both with latent and sensible heat, it seems most probable, that, by breathing a considerable proportion of it, both these kinds of heat, as well as the vital spirit itself, will be augmented. In this case, wherever the air naturally contains a larger quantity of oxygen than usual, the blood ought to be more fluid, as well as warmer, than usual,

usual, provided there be no evident cause why it should be otherwise. Accordingly in warm climates it is always found that the blood is thinner and more fluid than in such as are colder; but at the same time the temperature of the body is colder than in other countries. Zimmerman tells us, that, "at Curassau, Europeans gradually lose their fresh colour and vivacity: their natural heat even becomes three or four degrees less than it was at their arrival." The reason of this last, however, is evidently the excessive perspiration, which is more than sufficient to carry off the superabundant quantity of sensible heat thrown into the body, either by the rays of the sun, or by the superior quantity of oxygen naturally existing in the atmosphere; for it is now found, contrary to the opinions hitherto received, that in the warmer climates the atmosphere contains a larger proportion of oxygen than in the more temperate.*

From this discovery it appears, that, whatever may be the cause of the frequency and violence of epidemics in warm climates, it is *not* the want of oxygen. Nay, we should rather be tempted to think that they were produced by too great an abundance of it; and this the more especially when we know that animals confined in oxygen air are supposed to die of a burning fever; and it is likewise known that this kind of air is prejudicial to consumptive people, and even brings on the disease on those
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* That this is the case with the atmosphere at Martinico is now determined by a letter from Dr. George Davidson to Dr. Mitchell of New-York, inserted in the Medical Repository, vol. ii, p. 279. With equal parts of nitrous and atmospheric air, there was an absorption of 67 parts out of 100; but when two parts of atmospheric air were used to one of nitrous, the absorption was only from 52 to 58 parts; with a mixture of iron filings and sulphur, upwards of four tenths of the air were absorbed. These experiments were attested by a number of medical gentlemen who were present. In a letter subjoined from Dr. Chisholm, he says, that, having made a trial with iron filings and sulphur, the absorption was forty parts of an hundred, or exactly four tenths, with the eudiometer fifty-six. "It appears to me (says Dr. Chisholm) to be a singular circumstance, that, although the ground on which the Ordnance Hospital stands is a perfect morass, partially drained, yet a result almost exactly similar to that given by the experiments made with the eudiometer at my house, should take place, with the same instrument and in circumstances very different. The proportion at the Ordnance Hospital, I think, has been 58 out of 100, and at your house, a situation less swampy, and nearer the sea, it has been 67. An explanation of so singular a result, in situations so different, is perhaps more to be wished than expected."

who had it not before. From the experiments mentioned in the note, it seems probable that there are but few even of swampy places in hot climates, where oxygen does not predominate; and in these the heat thrown into the blood must still be augmented by that produced from the quantity of vapour decomposed or condensed in the lungs, which, as the condensation depends upon unknown circumstances, can never be foreseen, or ever prevented, but by a removal from the place.

With regard to other kinds of air, such as inflammable, phlogisticated air, &c. experiments are yet wanting to determine their effects upon people who breathe them habitually. The proportion in which they occasionally exist in the atmosphere on particular occasions has not been ascertained, and from the experiment made by Dr. Priestley with offensive air taken from a manufactory, as well as from Dr. Chisholm just mentioned, the probability is, that, even in the most offensive places, the proportion of azote is by no means so great to the oxygen that we could suppose the excess capable of producing a disorder of any consequence, much less a violent epidemic. Fixed air is always produced in the putrefactive process, and from its quality above mentioned of rarefying and heating the blood, might reasonably be supposed to have some share in producing epidemics, were it not that this kind of air is so readily absorbed by water, as well as a number of other substances, that, except at the very moment of emission, we can scarce suppose it to have any considerable effect.

Mr. Watt in a letter to Dr. Beddoes gives an account of a kind of air, seemingly more noxious than any yet discovered, which he produced by distillation from flesh and from wool. The effects upon himself were so disagreeable that he determined to make no more such experiments, lest he should to his own hurt discover a mode of producing some grievous disease. But we cannot, from an artificial air of this kind, argue to a natural one; as the one produced by Mr. Watt was totally different from any species of air naturally known. All that we can say is, that, as far as we can trace the connexion
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between our bodies and the different kinds of air which may be breathed, the latter act chiefly by the heat they contain, and which they impart to the body in various proportions; by which means the latent or sensible heat of the blood, and consequently of the whole body, may be occasionally augmented or diminished. Thus the body may be considerably altered in its constitution, and rendered more liable to diseases than it was before; but still it is found that diseases continue to appear at uncertain intervals, though all the causes we are able to discover, or at least all that are constantly evident to our senses, continue to operate without intermission. Though the obvious qualities of air and climate therefore may *predispose* to an epidemic, we cannot affirm any thing farther: the direct *cause* is always different, and hath hitherto so much eluded our researches, that we can have little hope of discovering it, except by reasoning from facts less obscure.

8. In all the operations of nature which we have access to investigate, the action of electricity is so much concerned, that we can scarce suppose it to be wanting in any of them. That it is concerned in preserving the health of the human body is likewise certain, if it be the fluid which acts in the nerves, as most probably it is. But whatever preserves health will also bring on disease, if it be applied to that purpose; and we have already seen that this fluid is capable of bringing on the most dreadful symptoms, viz. mortification in its highest stage, fever, convulsions, bilious discharges, lethargy, &c. If it be capable of producing all these, can we say that it is not capable of producing those of an inferior kind, or of varying diseases and symptoms without end, according to the immense diversity of its action? It may be said that this disease was occasioned by a violent stroke of electricity, similar to lightning; but how many people have declared, that, in the beginning of some violent epidemics, they have felt a sudden stroke at the time of seizure! Dr. Hodges mentions this in the plague of 1665 at London, but treats the accounts as effects of a distempered imagination.

tion. Procopius relates the same of the plague in his time, viz. that many of the diseased felt a stroke. It is true that they said such strokes were given by spirits in human shape, in which we know they must have been deceived; but, though they were mistaken in supposing that they had been struck by a spirit, it does not from thence follow that they felt no stroke at all. The people mentioned by Dr. Hodges did not say that they were struck by a *spirit*, yet he treats their accounts with as great contempt as though they had. Where people have no interest in deceiving, we ought certainly to look with a favourable eye upon their testimony; for, even although some part of it should be incredible, we have still reason to believe that there is some foundation for what they say. Thus, the poor sailor, so much frightened at the sight of a large bat in New Holland, was certainly mistaken in saying that he had seen the devil; he was even mistaken in saying that he had *horns*;* but from all this it would have been doing him great injustice to say that he had seen nothing. In like manner, when numbers of people in Procopius's time said that they were struck by spirits, when we find others in Dr. Hodges's time saying that they were struck by some invisible agent, when we know that electricity *can* strike in an invisible manner, it certainly is more reasonable to conclude that violent diseases sometimes do begin by an electric stroke, than that *all* who said they were struck in this manner were madmen or liars.

It may now again be asked, If the plague, or violent epidemics, be produced by electric strokes, why are they not much more frequently felt, or by what are those milder diseases produced which are not accompanied by any sensible stroke? Here we can be at no loss to say, that whatever produces the highest disease, may also produce the lowest. But, besides this argument, we have positive evidence that commotions in the electric fluid will

* In the account of this sailor's speech a most essential part of the devil's character was omitted. The speech, according to Capt. Cook, was, that the devil "was about the size of a one gallon keg, and very like it. He had horns and wings; and he was so near, that, if I had not been *afear'd*, I might have touched him." (See p. 105, n.)

will not only produce sickness, but very extraordinary and seemingly miraculous effects upon inanimate bodies. It has frequently been remarked that people are sick during the time of earthquakes, when the electric matter is in violent agitation. This has been accounted for from the motion of the earth, as the motion of a ship produces sea-sickness. But Dr. Hillary mentions a slight earthquake in Barbadoes where people were affected with sickness and vomiting for *some hours* after the phenomenon had ceased altogether; which undoubtedly shows, that a certain state of this fluid will disorder the human body, independent of every other circumstance, either of the heat or cold of the atmosphere, or the oxygen, hydrogen or azote contained in it. Again, we find that a certain state of the electric matter is not only capable of producing very extraordinary effects by itself, but also of communicating a power to the human body to do the same. A good number of years ago, a powder-mill near London was blown up. The explosion, as might be expected, was violent and tremendous; but the most remarkable circumstance was, that the electric matter, for a great way round, was thrown into unusual, though invisible, commotions, which discovered themselves by the rattling and breaking of china dishes though sitting apparently undisturbed upon their shelves. This phenomenon did not suddenly cease, and, during the time of it, some people appeared to be infected by an electric *contagion*; the power of breaking china seemed to reside in their bodies, so that if they approached or touched this kind of ware, it would instantly fly to pieces. Accounts of this extraordinary circumstance were published in many of the periodical works of the time, particularly in Dodfley's Annual Register; and the fact seems to be established beyond controversy. It proves that what has been advanced by Dr. Priestley concerning electrical operations, on a small scale, holds good also on a large one, viz. that the fluid, when once set in motion, is not easily quieted. It establishes the fact, also, that by great explosions of gun-powder the electric matter is violently agitated; and the consequence

quence of these agitations we cannot know. It may be said, indeed, that in the operations of nature the electric matter is often violently moved without any sickness taking place; neither in fact did any ensue at the time the powder-mill in question was blown up. But it must be remembered, that, in the ordinary course of nature, if the electric matter is moved, a receptacle is also provided for it. In a thunder-storm, where immense discharges of electricity are made from one cloud, there is another cloud of an electricity opposite to the former ready to receive them, or if not, the earth itself is frequently struck. In eruptions of volcanoes, the smoke receives the electricity discharged, and becomes charged with lightning of a more dangerous kind than that of ordinary thunder-storms; and Sir William Hamilton relates, that in the great eruption of Vesuvius, in 1794, lightning of this kind proceeded from the smoke for no less a space than *seventeen* days. But in artificial commotions of this fluid, where nature has not provided any receptacle, the phenomena must be quite different; and though we may with safety to ourselves interfere with the operations of fire and electricity to a certain degree, yet we may at last rouse these terrible elements into such action as will prove fatal to great numbers. Hence possibly may arise in part some of those sicknesses which take place after battles, in violent sieges, &c. An instance of this is said to have happened at Valenciennes, when last besieged by the Duke of York. A disease prevailed chiefly among women, children, and persons of a weak constitution; great numbers of whom died so suddenly that it was at first thought to be a plague, until it was found not to be infectious. The blood was found greatly dissolved, and the physicians ascribed it to the monstrous bombardment and cannonading which took place during the siege. Such was the account published in some of the newspapers of the time, and from the subsequent considerations it will not seem improbable that such things may take place.

From the experiments of Mr. Bennet (an English gentleman who has made several discoveries in electricity)
it

it appears, that we can neither brush a piece of chalk, open or shut a book, or do several of the most trifling actions, without agitating this subtile fluid in a perceptible manner. It is well known that in some cases we cannot stroke a cat's back without making the electric matter visible, and in some positions, by putting our fingers near the ears of the animal, very pungent sparks will be received. If then we can neither open or shut a book, if we cannot stroke a cat's back, or approach a finger to her ear, without agitating the electric fluid, is it reasonably to think we could burn a book, or kill a cat, without doing the same? Certainly it is not. If we cannot burn a book or kill a cat without affecting this fluid, it cannot be supposed that we can burn a house or kill a man without producing a still greater commotion; and in proportion to the extent of our devastations, and the multitude of our massacres, the invisible agitation of this element must become still greater and greater. In all these transactions it must be remembered that the fluid is forced out of its natural mode of action; for electric matter is made for the preservation, not the destruction, of life: but if, by long continued and extensive application of its power to a contrary purpose, we in some measure pervert its action, no wonder that we then feel the consequences of our own proceedings by its partly turning its power against the human race altogether.

Again, the human body is not made for the habitation of an infernal spirit, but for one of a quite different character. The boisterous passions of fury, discord and hatred ought never to disturb the mind, which is made for the habitation of endless peace and joy. The tumultuous passions are enemies to health; and this is so well known to physicians that they are very careful to prevent their patients from being any way ruffled or disturbed by violent passions. It is true these passions act upon the rational soul, which we may suppose to be distinct from that merely animal spirit, probably no other than the electric fluid, which runs along the nerves; but experience shows that each of these can act upon the other; a disorder

disorder in the body, particularly in the nervous system, will sometimes disturb the rational soul in such a manner as almost entirely to deprive it of all its faculties; while on the other hand a violent commotion in the rational soul may at once extinguish all the powers of life, as has already been shown from Zimmerman. Now, let any one consider what must be the sensations of those who engage in war. Whatever pity or humanity may be pretended, it is evident that in the day of battle all these sensations must give way to horror and fury on the part of the conquerors, and terror and dismay on that of the vanquished. That these passions never do entirely subside, is evident from the treatment of conquered countries and conquered people. When Jenghiz Khan beheaded his prisoners by hundreds of thousands, when Tamerlane pounded them in mortars, when Khouli Khan caused those who offended him to be carried from place to place, and a piece of flesh to be cut from their bodies at each stage, what must have been the sensations of these miscreants, and those whom they employed in such horrid scenes? On the other hand, what must be the sensations of those who see their dearest relations torn from them and slaughtered or treated even worse than if they were; themselves driven from their peaceable abodes to wander like beasts, while their cruel enemies exult in the miseries they have brought upon them, and glory in doing all the mischief they can, and spreading devastation as wide as possible? Thus, every passion, inimical to health, must, on both sides, be carried to its utmost height; and if these horrid scenes overspread a great part of the earth, for hundreds of years together, is it any wonder that plagues should ensue? If man, forgetting the dignity of his nature, converts the habitation assigned him by his Maker into a kind of hell, and himself into a devil, can we wonder that, in such circumstances, the spirit of life, originally appointed for his use, should become to such a being the spirit of death? Dr. Moseley seems to speak slightly of Helmont for assigning *moral* causes to fever; but if we consider the matter attentively it will certainly be found that the moral conduct of the human race in general

general has more connexion with the diseases which befall them, than we are perhaps willing to believe.

Most authors speak of some hidden, unknown and unsearchable power in the atmosphere as the occasion of plagues and other epidemics; and, from what has been already laid down, it seems by no means improbable that this hidden power resides in the electric part of it. But we know that electricity proceeds from the earth, as well as from the air; so that in some countries the evaporation of electric matter from the earth may affect the health of the inhabitants, as well as the constitution of the atmosphere. Hence some spots may be naturally unhealthy, and incurably so, independent of either the perceptible or imperceptible properties of the air; their healthiness may occasionally increase or decrease by means entirely beyond the reach of our investigation. Here then our inquiries must stop. We may indeed make a general conjecture that such differences are produced by the action of the electric matter; but, unless this action be pointed out, and some connexion traced between the situation of the country and a particular mode of action of the fluid, we may as well own our ignorance at once.

9. From all that has been said, then, we may conclude, that none of the obvious properties of the atmosphere, or of any constituent part of it, or of any variation in the proportion of its ingredients, can be accounted the cause of epidemic diseases; that the hidden constitution of the atmosphere may with probability be attributed to the agency of the electric fluid, and that by the action of this secret cause, along with the other more obvious properties of the air, such as heat or cold, moisture or dryness, &c. the human body may be so predisposed to diseases, that they will readily break forth; and that the conduct of mankind themselves may greatly contribute to this predisposition; the question then is, supposing every thing to be thus laid, like a train of gun-powder, what is the spark which first sets it on fire. Does the disease arise spontaneously in the first person affected by it, or does it come from without?

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In answer to this we must in the first place observe, that the accounts of all plagues mentioned in profane history trace their progress from one place to another; whence the probability is, that at its origin the disease was confined to a few, perhaps to a single person. In very few cases, however, has it been possible to trace it to an individual; and, even when this has been done, the unfortunate individual is always said to come from some other place. The instance quoted from Dr. Moore is perhaps the only one upon record where the plague arose spontaneously in any person separated from society; and from a single instance little can be inferred. In those terrible examples we have given of people being burned to death without any accident from terrestrial fuel, the agent seems almost certainly to have been electricity. In the plague of Procopius, said not to have been infectious, the strokes complained of by many patients seem to indicate an action of the same fluid. The same in the plague at London, which was infectious, and likewise of others. But, in cases of plagues which are not infectious, another question arises—By what means do such diseases spread from place to place? for even this dreadful pestilence of Procopius did not overspread the earth at once, but is said to have begun at Pelusium in Egypt. To this no answer can be given. To suppose an omnipresent contagion in the atmosphere, proceeding either from contagion or any thing else, cannot be admitted; for upon this supposition the whole world must have been infected at once. The cause, whatever it was, plainly moved from one place to another, or was successively generated in different places. Recourse may be had to the precipitation of the contagious matter of former plagues from the atmosphere; but to account for this in succession will be found very difficult; and the same difficulty will attend every other solution which may be attempted. Mr. Gibbon indeed censures Procopius for supposing it not to have been infectious; and perhaps the spreading of the disease by infection is the only way by which we can account, in a satisfactory manner, for the way in which it diffused
itself

itself over the world, which was, by first infecting the maritime places, and afterwards those which were more inland; always visiting the second year those whom it had spared the first.

10. Lastly, to form some idea of the nature of contagion, or infection, as it is more properly called, we must consider, that as the ethereal fluid, acting as heat, pervades the human body, so doth it likewise under that particular modification which we call electricity. Some kinds of air, indeed most of those with which we are acquainted, seem to act by augmenting or diminishing the latent or the sensible heat of the body. Such, when taken in moderate quantity, may produce slight diseases, as head-ach, &c. and, when taken very largely, may even put an end to life at once, either by rarefaction of the blood and rupture of the small vessels, as is the case with fixed air, or by oppressing the lungs entirely with their basis, which cannot be thrown out by the breath as in ordinary respiration. Others may affect the electricity of it, or what in this treatise has been called the *vital spirit*, as well as the latent or sensible heat. The consequence of this will be diseases of a more serious nature; for upon this principle in all probability depend not only the secretion and proper regulation of the nervous fluid, but what has been called the *crasis*, or proper consistence of the blood and other fluids. Hence it is possible that such an instantaneous shock may be given to the body, as will not only injure the organization in an irreparable manner, but may be felt throughout the whole body like an electric stroke, even though there be no visible fire, or sensation of burning, as in the case of the Italian priest and others, who perished in such a miserable manner.

Formerly all acute diseases were supposed to depend on morbid matter taken into the body, and absorbed by the blood: the cure was thought to be accomplished by the expulsion of this morbid matter from the body by sweat, or some of the other natural evacuations. The doctrine was attended by many difficulties, and in many cases did not admit of a satisfactory explanation.

It was therefore laid aside, and the debility or excitement of the nervous system arose in its place. But this new system admitting of *miasmata* and *contagion*, it was plain that morbid matter still kept its ground. With a view, it would seem, to render the nervous theory more complete, it has been found necessary to deny the doctrine of contagion and infection entirely. This has been done, wherever there was a possibility; but the phenomena of the small-pox and measles, as well as those arising from poisons, still militated strongly in favour of morbid matter. To avoid the force of arguments drawn from these sources, the doctrine of absorption was denied, and contagions of all kinds were said to act immediately upon the nervous system without affecting the blood or other fluids. At last the matter seemed to be decided by the experiments of the Abbe Fontana on poisons. He found that some proved fatal by being mixed with the blood, others by being applied to the nerves, and others by being taken into the stomach. Even this did not give satisfaction. It was contended that the effects of poisonous bites were too quick to be accounted for on the principle of absorption; that, after the most violent symptoms had commenced, they might be removed by cutting out the part affected; and consequently that, instead of any absorption by the blood, we were only to believe that the nervous system was irritated.

“ Poisons, (says Dr. Girtanner) remedies, and, in general, all surrounding bodies, acting only on the irritable fibre, it follows that they act upon the system in a similar manner, and that every substance capable of producing the greatest possible effect upon the fibre, that is to say, every substance capable of exhausting all the irritability both of the fibre itself and of the system, in an instant, as for instance, laurel water, or white arsenic, is also capable of producing all the inferior degrees of action, either by acting on a fibre less irritable, or by acting upon the same fibre, but in a less quantity. Laurel water, opium, white arsenic, ammoniac, are of course both medicines and poisons capable of healing, as well as of producing, all maladies whatsoever,

“ ever, without exception.* And this is confirmed by a
 “ number of experiments which I have made upon dif-
 “ ferent animals. This truth seems to me of the utmost
 “ importance; and the Abbe Fontana, who made more
 “ than six hundred experiments to prove that ammoniac
 “ is no remedy against the bite of a viper, would have
 “ saved himself the trouble, had he known it. If, instead
 “ of applying the venom of the viper to so many animals,
 “ and afterwards applying ammoniac to the wound, he
 “ had made a single comparative experiment, and appli-
 “ ed ammoniac to a wound made by a lancet that was
 “ not poisoned, he would have found that ammoniac
 “ itself, applied in this manner, would have produced a
 “ disease exactly analogous to that caused by the venom
 “ of the viper; and, consequently, so far from removing
 “ the malady, must necessarily increase it, by exhausting
 “ the irritability of the fibre in a much less time than
 “ the venom of the viper by itself was capable of doing.
 “ Mr. Fontana has made more than six thousand ex-
 “ periments upon the poison of the viper; he employed
 “ more than three thousand vipers, and caused to be bit
 “ more than four thousand animals; and the conclusion
 “ he drew after this truly enormous number of observa-
 “ tions was, that the poison of the viper kills all animals,
 “ and produces the disease by its action on the blood.
 “ But why did Mr. Fontana neglect to make the de-
 “ cisive experiment, the *experimentum crucis* of Bacon?
 “ It is well known that frogs, and many animals with
 “ cold blood, live a long time without the heart, and
 “ entirely deprived of blood. If therefore the poison of
 “ the viper kills animals by its action on the blood, it
 “ will not destroy frogs without blood. But experiment
 “ contradicts this reasoning. The poison of the viper
 “ will kill frogs without blood in as short a time as it
 “ kills

* This is an assertion so extravagant, that is difficult to imagine what
 could induce any one to make it. Did our author ever hear that laurel water,
 &c. produced the venereal disease, the plague, yellow fever, gout, stone, small-
 pox, &c. &c. or to what patients and in what diseases did he ever administer
 this remedy with success? I mean not to deny that these substances will cure
 some diseases as well as produce others; but such an unqualified expression
 that they can not only produce but cure all diseases without exception, never
 can be admitted.

“ kills those animals who have not lost their blood. It
 “ is not therefore by its action upon the blood that the
 “ venom of the viper destroys animals ; and thus does it
 “ happen that a single experiment frequently overturns
 “ all that *six thousand* other experiments have apparently
 “ established. According to my experiments, poisons
 “ operate upon the blood just as they do upon the mus-
 “ cular fibre, by depriving it of its principle of irritability,
 “ or of its oxygen. After having made this observation
 “ upon the experiments of Mr. Fontana, I must do him
 “ the justice to add, that I have found all his experi-
 “ ments very accurate, and that in all those which I have
 “ repeated, the result has been exactly conformable to
 “ the account given by him ; it is in his conclusion only
 “ that he appears to be deceived.”

On this I must in the first place observe, that since
philosophers and *truth* seem to be so far distant from each
 other that even *six thousand* experiments cannot bring
 them together, it were greatly to be wished that in their
 researches they would pay a little more regard to huma-
 nity. If the Author of Nature has set man at the head
 of the creation, if inferior animals must patiently re-
 sign their lives to preserve ours, are we therefore autho-
 rised to torment and put them to death by thousands
 for every idle whim that comes into our heads ? After
 Spallanzani, Fontana, Girtanner and a multitude of other
 learned *barbarians* had cut in pieces, boiled alive, poisoned
 and tortured thousands of inoffensive animals, new massa-
 cres it seems must be made, and new tortures inflicted,
 because an *experimentum crucis* is still wanted ! If
 knowledge is to be obtained only by such means as
 these, it certainly must be derived from a very polluted
 source.

2. The experiment on which Dr. Girtanner builds
 so much is far from being above suspicion. Though
 we may cut the heart out of an animal, and let it bleed
 as freely as possible, yet we certainly overrate our abili-
 ties if we say that *all* the blood is taken out of it. The
 more perfectly an animal is bled, the less irritability it
 has ; which gives a reasonable suspicion, that, if *all* the
 blood

blood could be taken away, the irritability would cease entirely. In frogs, and all other cold blooded animals, the blood contains fewer red globules than in such as are warmer; the circulation is more languid than in such as have warm blood, and, of consequence, the blood will retain its irritability for a longer time, and it will likewise be more difficult to deprive the body of all its blood. In making this experiment, therefore, Dr. Girtanner ought to have brought unexceptionable proofs that he had deprived the frog of *all* the blood it contained. But, as this was not done, we shall be ready to suspect that some was left; in which case we should be still as uncertain as before whether the poison acted on the irritable fibre, or on the blood. But the decisive experiment, or *experimentum crucis*, seems to have been made by Fontana himself, by injecting a little of the diluted poison of the ticunas into the jugular vein of a rabbit. Here the poison was applied to the blood itself. It could get at no other part of the fibre but the inside of the vein, which is not accounted very irritable; and the quantity injected was so small, that the Abbe thought his experiment had failed; yet the animal died as if by lightning. The moment he turned his eyes towards it, it was absolutely dead, without discovering the least convulsive agony, or other sign of some little life remaining, generally observable for some time in animals killed by the common methods. On applying the same poison to a large nerve of another animal of the same species, no injury followed.

3. The dispute is of no consequence, and the experiment will prove the same thing whether we suppose the poison to act upon the irritable fibre (the nerves and muscles) or upon the blood. The only important point to be ascertained is, whether there be in nature any substance which, applied to the internal parts of the body, or to a wound, will instantly disorder the whole in such a manner as to bring on a violent disease which may prove mortal in a short time. If any such there is, that substance, whether solid or fluid, visible or invisible, may with propriety be called *contagion*; and if any such proceeds from

from the body of a diseased person to one in health, the vapour so proceeding is *infection*. As to the *mode* of its operation we are little concerned; the sudden manner in which people are affected shows that poisons kill by suppressing in a very short time the principle of life, which seems to be analogous to electricity, or rather the very same with it; neither is it more incredible that the poison of a serpent should kill by disturbing the natural electricity of the body, than that the stroke of a torpedo, or electrical eel, should kill by the same means. The only difference is, that, in the case of poisons, the pernicious substance is introduced into the body itself; in the torpedo, it comes with violence from without. The former we may compare to the silent discharge of an electrified jar by a point, the latter to its discharge with a violent flash by a knob. But that in poisonous bites the blood is greatly affected, and that in a very short time, we certainly know. There are some kinds of serpents whose bites are so suddenly fatal, that no cure can be applied: one of these, called the small *laharra*, is mentioned by Mr. Bancroft in his Natural History of Guiana. Mr. D'Opsonville, in his Philosophic Essays, takes notice of one in the East-Indies, which he calls the *poison serpent* or *serpent poison*, which seems to be as bad as the *laharra* mentioned by Bancroft. This too is but small, viz. two feet long, and very slender. Its skin is freckled with "little traits of brown, or a pale red, and "contrasted with a ground of dirty yellow: it is mostly "found in dry and rocky places, and its bite proves mortal in less than one or two minutes. In the year 1759, "and in the province of Cadapet, I saw several instances of it; and, among others, one very singular, "in the midst of a corps of troops, commanded "by M. de Buffy. An Indian Gentoo merchant perceived a Mahometan soldier of his acquaintance "going to kill one of these reptiles, which he had found "sleeping under his packet. The Gentoo flew to beg "its life, protesting that it would do no hurt if it was "not first provoked; passing at the same time his hand "under its belly, to carry it out of the camp; when "suddenly

“ suddenly it twisted round, and bit his little finger ;
 “ upon which this unfortunate martyr of a fanatic chari-
 “ ty gave a shriek, took a few steps, and fell down in-
 “ sensible. They flew to his assistance, applied the ser-
 “ pent-stone, fire, and scarifications, but they were all
 “ ineffectual ; his blood was already *coagulated*.* About
 “ an hour after I saw the body as they were going to
 “ burn it, and I thought I perceived some indications
 “ of a *complete dissolution of the blood*.”

The bite of the *brulan* or *burning serpent*, according to the same author, is almost as terrible. “ This is nearly
 “ of the same form with the last, its skin is not quite so
 “ deep a brown, and is speckled with dark green spots :
 “ its poison is almost as dangerous, but it is less active,
 “ and its effects are very different. In some persons it is
 “ a devouring fire, which, as it circulates through the
 “ veins, presently occasions death ; the blood dissolves
 “ into a lymphatic liquor resembling thin broth, with-
 “ out apparently having passed through the intermedi-
 “ ate state of *coagulation*,† and runs from eyes, nose and
 “ ears, and even through the pores. In other subjects
 “ the poison seems to have changed the very nature of
 “ the humours in dissolving them ; the skin is chapped
 “ and becomes scaly, the hair falls off, the members are
 “ tumefied, the patient feels all over his body the most
 “ racking pains, then numbness, and is not long in
 “ perishing.”

From these accounts it is plain that poisons do operate very powerfully on the blood ; and if they do so in one case it is reasonable to think that they do so in all. According to the degree of strength of the poison, however, we are sure that the effects will be more or less visible to us ; but, though we should not be able to perceive any alteration whatever in the consistence or colour of the vital fluid, we cannot positively say that it has
 not

* There must certainly be some error here ; for as he mentions a *dissolution* of the blood so soon afterwards, we should think it impossible that any *coagulation* would have taken place. Perhaps the word only imports that the circulation was completely stopped.

† The blood certainly does not coagulate in the vessels, in any case whatever, unless by injecting something into them.

not undergone any change ; for the spirit which operates in it is too subtile for our observation. In the beginning of almost all diseases, perhaps, blood drawn from a vein will not be perceptibly different from that of a person in health ; and Dr. Fordyce particularly takes notice of this in fevers ; but as the disease goes on, an alteration becomes very perceptible, which gives just ground for suspicion, that there had been some alteration from the very first, though invisible to us.

After all our disputes, however, we shall find that the controversy, though ultimately important, begins more about words and trifles than any thing else. Dr. Brown used the word *excitability*, Dr. Girtanner uses *irritability*, and the author of this treatise, the words *vital spirit* and *electricity*, to express something equally unknown to them all. The only difference is, that Drs. Brown and Girtanner speak of their excitability and irritability as a kind of power essentially inherent in living bodies, acted upon indeed by certain substances, but incapable of deriving any supply from without ; the author of this treatise considers it only as a modification in the human body, or an *organization*, if we please to call it so, of that fluid which he believes to be universally diffused, under the names of heat, light and electricity. Hence that portion modified or organized in the human body must be under an entire and absolute dependence upon the immense mass of surrounding fluid, and, by any alteration in the motions of it, must be often very perceptibly affected ; nevertheless as this fluid was originally created to preserve and not to destroy human life, there is much less danger from a *natural* than from an *artificial* commotion in it. In some visible bodies, such as poisons, the fluid acts in such a manner as to counteract the operation of that part which is organized in the blood or nerves, or both. Hence on the introduction of such into the body the disorder flies like lightning through all parts of it, and in a very short time brings on death. In those vapours properly called *contagions*, the opposite action is less violent, and therefore the disorders they produce are in proportion. Hence such diseases may either
be

be promoted or retarded by the perceptible properties of the atmosphere, which in poisons have little or no effect. There is indeed a remarkable difference in the strength of the poison secreted in the bodies of serpents at certain seasons of the year, or according to their food. M. D'Opsonville observes that the poison of serpents is in general more powerful, the more they live in hot and dry places, where they feed upon insects that are full of saline, volatile and acrimonious particles. But, notwithstanding this difference in the strength of poisons according to the circumstances of time and place, there is not the least reason to suppose that poison of a given strength would not produce the very same effects, let the state of the atmosphere be what it would.

If therefore we certainly know that there are some kinds of aerial vapours which when applied to the human body do exert a power directly opposite to the vital principle, there is no reason to doubt that such vapours may be confined among certain soft substances, such as cotton, wool, &c. and remain there for an unknown length of time, again exerting their malignant powers, when a fresh object comes in their way. Besides, as all kinds of air with which we are acquainted consist of a basis united with the ethereal fluid and volatilised by it, there is reason to suppose that contagions themselves are formed in the same manner. Some kinds of air also are very easily decomposed, in which case the basis attaches itself to some terrestrial substance, the ethereal fluid which volatilised it diffusing itself around in an invisible manner, but generally with a perceptible heat. Fixed air affords a notable example of this ; for, by exposing it to lime-water, or even dry lime, alkaline salt, volatile alkali, or common water, a decomposition of the air very readily takes place, and its basis is found to be attached to those substances. What happens to fixed air may also happen to *contagion*. The basis of it may have a tendency to unite itself to cotton, or such like substances, and thus may not only infect them, but concentrate itself to such a degree as to produce a disease much more violent than that of the person who gave the infection ;

and something of this kind has even been observed with regard to infected cotton. But now another question occurs: As fixed air, by being attached to terrestrial substances, loses its aerial property, why should the basis of contagious effluvia still retain its malignant quality though in a state of decomposition? Here we are again helped out by analogy. Fixed air is known to be capable of resuming its aerial properties occasionally, from causes unknown to us, though we cannot suppose them to be any thing else than the invisible action of the ethereal fluid so often mentioned; which, being guided by laws unknown to us, we cannot possibly comprehend. The fact, however, is certain, that the basis of fixed air does very often quit the substances to which it is attached, and assume an aerial state in great quantity, and with very mischievous effects. Thus the old lavas of volcanoes, if chemically tried will be found at *all* times to contain great quantities of the basis of fixed air, but it is only at *some* times that the mofetes which are supposed to be the air itself, break forth.* In like manner the strata under ground always contain great quantities of the aerial basis, but the *damps* in mines, which are certainly known to consist mostly of fixed air, do not always appear; neither do they gradually accumulate, but come suddenly, spreading unexpected destruction among those who unfortunately come in their way. The same may take place with contagion. After remaining some time in a state of decomposition it may have a tendency to become volatile again, or it may lie dormant entirely; and this last will explain what is quoted from Dr. Ruffel, p. 178, that sometimes commerce may be carried on with infected places without danger.

Thus we see that the dispute, originally begun about a word, involves at last a matter of the utmost importance; for, if it be found unreasonable to believe that any such thing as contagion exists or can exist, it follows of course that it is also unreasonable to take any precautions against it. Mr. M'Lean even goes a step beyond those who deny the existence of contagion; for we find him

* See p. 128, note.

him also denying that putrid effluvia can produce epidemics ; according to which doctrine, it seems, we may not only safely visit places accounted the most dangerous on account of infection, but live in all manner of filth and nastiness with impunity. It is plain that no person can ever prove that it is impossible for contagion or any thing else to *have an existence*. Indeed if nothing had ever induced people to believe that it did exist, it would have been superfluous to say any thing about it. But when we have innumerable testimonies to the contrary ; when the opinions of the greatest physicians, as Dr. Lind, Dr. Clarke, Dr. Mead, Dr. Sydenham, Dr. Fordyce, Dr. Ruffel, &c. agree that not only the plague, but *every* kind of fever, is infectious ; when we know from the analogy of nature that contagion *may* exist ; when we know that there certainly *are* powers in nature able to produce it ; is all this to be thrown aside merely on the strength of a theory, and a theory too which can never be proved ? for it is impossible to prove the *non-existence* of any thing, much less the *impossibility* of its existence. The lives of mankind are too precious to be sported with on philosophical theories ; and prudence will always suggest, that wherever danger may at any time arise, there it is proper to be on our guard.

Dismissing at length the subject of contagion in general, we now enter upon the question, Whether doth it appear from fair investigation of testimony, that the plague has, at any time, been communicated by contagion or not ? And here I shall confine myself to what has been adduced by Dr. P. Ruffel on the subject ; for, if we find that the disease has only *once* been introduced by contagion, it signifies nothing though we were able to prove, which we never can do, that it had been *an hundred* times bred in some other way. The matter is of too great importance to allow even a *chance* of its importation by the neglect of the precautions necessary to prevent it.

Our author begins with observing, that though the infectious nature of the plague had been a question much agitated in the schools, “ it was less to be expected that
physicians

“ physicians who had been engaged in practice among
 “ the infected should have persisted in the opinion that
 “ the disease was never communicated by contagion.”
 Such, however, has been the case. In 1720 some French
 physicians laboured exceedingly to prove that the plague
 which then raged at Marseilles and throughout Pro-
 vence arose from corrupt humours bred in the body in
 consequence of irregularity in the seasons, and bad ali-
 ment ; that it was spread by the same means, in concur-
 rence with terror, grief, despondence, or other debilitat-
 ing affections of the mind ; but was neither bred nor
 disseminated contagion. Dr. Ruffel mentions in a note,
 seemingly with surprise, that “ *so late* as the year 1778,
 “ Dr. Stoll of Vienna should have written expressly
 “ against the doctrine of pestilential contagion.” To
 this professor he thinks it a sufficient answer to quote
 the following passage from Mr. Howard on Lazarettos.
 “ It must appear very strange, that he should go back to
 “ Livy’s Roman History for proofs to establish his point,
 “ totally neglecting all the facts concerning the nume-
 “ rous visitations of the plague recorded in modern medi-
 “ cal books, or which had happened during his own
 “ time. I suppose professional men will lay very little
 “ stress upon all that can be said on pestilential diseases,
 “ in general, which happened in wars and sieges two
 “ thousand years ago, as applied to the plague properly
 “ so called, a disease then confounded with various
 “ others from which the accuracy of latter observa-
 “ tions have sufficiently distinguished it.”

Dr. Ruffel complains of the French physicians at
 Marseilles having made unfair representations ; particu-
 larly that while they produce as irrefragable arguments
 against contagion their own escape unhurt, amid circum-
 stances of supposed danger, they pass slightly over, or
 omit all mention of numbers of the medical assistants
 whom they saw perish in the exercise of their profession.
 M. Dedier, however, who at first opposed the doctrine
 of infection, at last renounced his opinions so far as to
 allow that the disease might be communicated to dogs
 by injecting pestiferous bile into their veins ; and he
 likewise

likewise admitted that it might be communicated from one human creature to another, by drawing in for a considerable time the breath of a diseased person, putting on his shirt, lying in the same bed-clothes, and touching the wounded parts of one's own body with hands embrued with the sweat or blood of one infected. He affirms, however, that the atmosphere of a person in the plague is no more to be dreaded than that of a venereal patient ; and that the touching or dressing of buboes or carbuncles is not attended with any danger. He restricts the infectious quality of the humours to the bile ; but the *inoculation* of a person by the matter of a pestilential ulcer* undoubtedly decides this point against him.

On the subject of contagion Dr. Ruffel observes, that the vague manner in which the word has been used has given rise to much confusion. Some, taking advantage of the inaccurate mode of expression on this subject used by Dr. Mead, attacked him with sophistical nonsense. The following may serve as a specimen, from a pamphlet entitled "*Distinct Notions of the Plague, &c. by the Explainer.*" This *explainer* observes, that, according to Dr. Mead, " air and his other causes propagate and " spread contagion, not the plague ; and therefore either " contagion and the plague are the same, or else the " plague is not considered ; if the first, then his causes " propagate the plague ; and the plague accompanies " the plague ; an excellent defence ! But, if the plague " is out of the play, then contagion accompanies no- " thing."—From writers like this we certainly can expect nothing.

The opinion of Dr. Cullen concerning contagion has been already noticed, p. 179 ; but though he supposes it to be a matter floating in the atmosphere, he observes that contagions are never " found to act but when they " are near to the sources from whence they arise ; that " is, either near to the bodies of men, from which they " immediately issue, or near to some substances which, " as having been near to the bodies of men, are embu-
" ed

* See p. 196.

“ed with their effluvia, and in which substances these
 “effluvia are sometimes retained in an active state for a
 “very long time. The substances thus imbued with
 “an active matter may be called *fomites* ; and it appears
 “to me probable, that contagions as they arise from fo-
 “mites, are more powerful than as they arise immedi-
 “ately from the human body.” This opinion concern-
 ing the great power of contagion imbibed by certain
 substances is conformable to what was above laid down
 by reasoning *a priori* on the nature of contagion.* It
 is doubted by Dr. Ruffel, but Dr. Lind adopts it, and
 Van Swieten gives his opinion to the same purpose.
 “I am convinced, that the body of the diseased, kept
 “exactly neat and clean, is not so liable to impress the
 “taint, as his late wearing apparel, dirty linen, and un-
 “cleanliness of any sort about him long retained in that
 “impure state. I say, these last contain a more concen-
 “trated and contagious poison than the newly emitted
 “effluvia or excretions of the sick.”

With regard to the original cause, our author observes,
 “that the plague is bred or produced originally from
 “vitiating human effluvia, is a matter which has by no
 “means been established on proper authority.” Setting
 aside therefore inquiries of this kind, he thinks it suffi-
 cient to inquire whether the infection be not communi-
 cated from a sick to a sound person by immediate con-
 tact ; whether it be not also communicated at some dis-
 tance through the medium of the air ; and whether sub-
 stances of various kinds do not imbibe the infectious ef-
 fluvia, and retain them for a considerable time. So far
 as these points admit of proof from the experience of
 times past, the question concerning pestilential contagion
 will admit of a solution, independent of all theoretic rea-
 soning whatever.

2. On the subject of contagion people have been
 embarrassed by confounding the true plague with other
 malignant diseases. This has been done, not only by
 the ancients, but by some moderns ; and our author
 quotes Dr. Pye, saying “that any epidemic sickness,
 “which

* See p. 226.

which rages with more than ordinary violence, and “which occasions extraordinary mortality amongst mankind, may be, and is, properly termed a pestilence, or the plague.” By not attending to the proper distinctions, in these cases, circumstances belonging to what are commonly termed malignant or pestilential fevers will often come to be very improperly applied to the true plague.

3. “It may be remarked, that those who contend in favour of contagion, from zeal for accumulating proofs, have collected a number of facts from historical records of very unequal authority, and often with little critical skill in discrimination. Of this error their antagonists availing themselves, have selected from the mass the instances most liable to doubt or objection, and have endeavoured, by their manner of arranging them, to place the whole in a ridiculous light; while more important instances are either evasively passed over, misstated in the representation, or invalidated by general declamation on the little credit due to historians in matters of physic, or the prejudices prevalent in ancient times of ignorance, and on contradictions to be found in the arguments of those who support the system of contagion.”

To this the Doctor adds the great quantity of hypothetical reasoning which has been introduced into the controversy, and above all the unfair dealing of the parties in carrying on the dispute, which has reduced the matter from “a calm inquiry in pursuit of truth, to a wrangling contest for victory.” Lastly he insists, that, had it not been for the misrepresentations and sinister dealings of those who have written against contagion, “the question seems to have been properly resolved in the affirmative;” and he complains greatly of the conduct of the Montpelier physicians in this respect, inasmuch that “their misstating of circumstances, and the partiality so evidently discoverable in their narrative of cases, will serve more effectually to remove doubts on the subject, than any arguments that could be used against their hypothesis.”

On

On the subject of contagion our author observes, that some difficulties still remain ; but these, though proper subjects of future inquiry, “do not appear to be
 “of force sufficient to invalidate facts already established.
 “It is well known, that the same person who has been
 “inoculated two or three times for the small-pox without effect, even in an epidemic season, has afterwards
 “received the infection upon repeating the operation
 “at a distance of time when the disease was hardly sporadic. The cause of this remains unknown ; but ignorance of it was never produced as an argument
 “against the reality of variolous contagion. . . . If
 “of one hundred persons exposed to the infection of
 “the plague by a near approach to the sick, ninety
 “should fall sick, shall human inability to assign satisfactory reasons for the escape of the other ten be converted into a positive proof against the disease having
 “been caught by contagion ? If persons retired from all
 “commerce with the infected and their attendants,
 “breathing the same air with the rest of the inhabitants,
 “and nourished by the same aliment, remain untouched during the ravage of the plague, as long as they
 “continue secluded, but, upon unguarded communication, are taken ill like others ; can any rational doubt
 “be entertained about the cause of their former security ? Or if through stealth, or neglect of requisite
 “precautions, substances tainted by the sick should be conveyed into these secluded retreats, and persons
 “living temperately as before, ignorant of what had
 “happened, and consequently in the midst of imaginary
 “security, happen to be seized with the distemper ; can
 “it with any show of reason be ascribed, not to contagion, but to terror, or to colluvies in the stomach and
 “bowels, produced by intemperance and bad aliment ?
 “The instances here alluded to are not the *creation of fancy*, but *strictly consonant to repeated experience* in
 “Turkey ; to say nothing at present of what has been observed at Marseilles and in various cities in Europe.”
 “But a greater difficulty than that of all persons not
 “being equally susceptible of the infection arises from
 “the

" the cessation of the plague, at a period when the sup-
 " posed contagious effluvia, preserved in apparel, furni-
 " ture, and other fomites, at the end of a pestilential
 " season, must be allowed to exist, not only in a much
 " greater quantity than can be supposed to be at once
 " accidentally imported by commerce, but in a state
 " also of universal dispersion over the city: the fact,
 " however unaccountable, is unquestionably certain;
 " the distemper seems to be extinguished by some cause
 " or causes equally unknown as those which concurred to
 " render it more or less epidemical in its advance and at
 " its height. In Europe something may be ascribed to
 " the means employed for the cleansing of houses and
 " goods supposed liable to retain the latent seeds of in-
 " fection; but, at Aleppo, where the distemper is left to
 " take its natural course, and few or no means of puri-
 " fication are employed, it pursues nearly the same pro-
 " gress in different years: it declines and revives in cer-
 " tain seasons, and, at length, without the intervention
 " of human aid, ceases entirely."

On this we shall remark in general, that the failure of
 contagion in some cases to produce the usual effects may
 proceed from some constitution of the body, disposing it
 not to allow the cause to produce its usual effects at one
 time, though at another, the constitution may be so far
 changed as very readily to admit it. This opinion has
 been very generally received among medical people, who
 have, to this singularity of constitution given the name
 of *idiosyncrasy*. It is, however laughed at by Mr. M'Lean.
 " As the fact (says he) cannot be denied, that a great
 " majority have escaped after contact with persons ill of
 " diseases supposed to be contagious, attempts may per-
 " haps be made to account for it by supposing a certain
 " peculiarity of constitution, which exempts from, or
 " disposes to, disease. Is it the many who escape that
 " have this happy peculiarity of constitution; or the few
 " who are seized that are so unfortunate as to possess it?
 " The former are evidently too numerous to admit such
 " an hypothesis. The property must therefore, I con-
 " clude, be given to the latter. But a child here and

H h

" there

“ there is exempted from small-pox, although exposed
 “ to its contagion. In order to preserve a consistency,
 “ this fact must be accounted for by the same or another
 “ peculiarity of constitution. Peculiarities of constitu-
 “ tion, then, exempt from contagion in one case, and
 “ dispose to it in another; and thus a term, which in
 “ reality means nothing, may be made to account for
 “ any thing. For my own part I confess my inability to
 “ comprehend any other *peculiarities of constitution*, or
 “ *idiosyncrasies of habit*, than what are constituted by the
 “ different degrees of health and disease; the different
 “ states of the excitability.”

In the same manner that Mr. M'Lean argues with
 regard to disease, let us argue concerning bodily strength.
 Some men are able to lift a weight of 6 or 700 pounds,
 but a great majority cannot lift above 300. Whence
 proceeds the difference? Is it the few who lift the great
 weight that *by nature* have more strength, or is it the
 many who can lift only the smaller that *by nature* have
less? This is precisely his argument, and there needs no
 other refutation than stating it in this manner. What
 he calls the states of excitability are as much *idiosyncrasies*
 at the time as any thing else. Mr. M'Lean will not
 deny that a person debilitated by certain causes is more
 liable to be seized with typhus fever than one who is not.
 What does this proceed from, but that the body of the
 one is prepared for the disease, is *constitutionally* disposed
 to receive it, or has an *idiosyncrasy* of habit disposing to
 it, which the other has not? It is true, that unless we
 point out the circumstances which constitute this idio-
 syncrasy we do nothing; but Mr. M'Lean's scheme, of
 resolving every thing into *excitability*, would forever pre-
 vent us from doing so. This is the great deficiency of
 the Brunonian system altogether; for, by attending
 only to the animal life of the body, he seems to have
 absolutely forgot that we had any thing in common with
 vegetables. The bones, for instance, or indeed any part
 of the body, cannot be formed by the power which go-
 verns it after it was formed. The growth of the human
 body is as strict vegetation as that of a tree; and there-
 fore

fore we find that after the excitability is entirely gone, after death has taken place for a considerable time, the body still retains its form, and would do so forever, did not other powers interfere with it. Human life therefore is a compound of the vegetable and animal life, the former being the basis of the latter ; and it is the vegetable life which is much more commonly the subject of disease than the animal life. In vegetables we observe an *idiosyncrasy* of habit, as well as among animals. Some, even of the same species, are much more vigorous than others, and, among some, diseases are much more common than others. In like manner among the human race some are strong, others weak ; in some the blood is much more consistent, and coagulates on exposure to the air much more firmly than in others. Excitability, or excitement, is common to all, and the degrees of it (though enumerated by Yates and M'Lean in a kind of thermometrical scale) must be merely imaginary, because excitability is not the object of our senses. The obvious properties of the body itself, independent of any excitement whatever, are principally to be considered in medicine. These constitute the peculiar constitution, or the *idiosyncrasy* of habit, belonging to each individual. Yet, in defiance of every consideration of these obvious properties, which all have access to observe, the new system leads us only to consider an invisible and unknown being called *excitability*. Hence diseases peculiar to certain constitutions more than others are said to be occasioned only by certain degrees of excitability common to all, or perhaps to consist in these very degrees themselves. Thus a peculiar mode of practice has been introduced, in which almost the whole materia medica is rejected. We have already quoted Dr. Girtanner, saying that *all diseases whatever* may be *cured*, as well as *produced*, by only *four* articles ; but in the following quotation he goes still farther. " The art of pharmacy and the science of prescription will become useless ; a phial of alcohol or laudanum will supply the place of that enormous quantity of drugs which crowd the shops of apothecaries. The trade of the druggist—but hold ; if I
" continue

“continue this prophetic language, I shall only expose myself to ridicule,” &c. Reveries of this kind certainly deserve the most severe reproof. People may no doubt amuse themselves with *theories* as well as any thing else, while these theories continue inoffensive; but when the belief of them leads to a rejection of what has been established by the *experience* of many ages, they begin to assume a consequence which they originally had not. We have already seen that a disbelief of the doctrine of contagion leads people into a practice accounted dangerous by many, and which cannot be proved to be safe. A total rejection of medicines, the efficacy of which have been attested by thousands, and which never can be proved to have *no* efficacy, must be attended with still worse consequences, as thus we should be deprived of the means of curing those diseases which our imprudence in rejecting the former doctrine might have brought on. But, to return to the subject of the plague.

The disappearance of the disease, while all the causes that we suppose capable of producing it remain in full force, is a demonstration that it depends on something entirely distinct from the human body, and from all those powers which perceptibly act upon it. It proves that this unknown power has only a temporary existence, coming to perfection at one season, and dying away in another; sometimes capable of being revived, and sometimes not. This corresponds entirely with what has been laid down concerning contagion itself, viz. that like other aerial vapours it is capable of decomposition, and remaining for an uncertain length of time in a dormant state; but that occasionally it may revive, and appear unexpectedly, as *mofetes* arise from lavas, or damps in mines. After a city has been thoroughly infected with a pestilential disorder, therefore, there can be no security against its re-appearance; it being impossible to know whether the contagion may not be still existing and capable of being revived by some unknown cause, though it has been dormant ever so long. In such cases it may with propriety be said to have arisen *spontaneously*, though, had it not been there at a former period, there could

could be no reason to think that it would have appeared at that time.

Dr. Ruffel next takes into consideration the plague at Marseilles in 1720, of which he says the accounts "are more full, and circumstances better authenticated, than most of the accounts of anterior plagues to be met with in books." From the opposition to the doctrine of contagion at the time, he also supposes that the facts relative to its introduction would be severely scrutinized, and falsehoods detected: "but (says he) if, instead of such detection, the most material have been passed over in silence, and little more than hypothetical reasoning opposed to others, the main facts may be considered as established, if possible, more firmly than they were before." These facts are stated as follows: "1. That the plague did not exist in France before the 25th of May, 1720. 2. That it was imported in goods from the Levant, by a ship which left the coast of Syria the beginning of February, and arrived at Marseilles the 25th of May. Two days after her arrival one of the sailors died; an officer of quarantine who had been put on board died on the 12th of June, and a cabin boy on the 23d. Some porters employed in opening the merchandise at the lazaretto also died about this time. Three others were taken ill in the beginning of July, with buboes in the groin and axilla. This alarmed the surgeon of the lazaretto; a consultation was held with two other surgeons on the 28th; the disease was unanimously declared to be the plague, and the three patients died next day; the surgeon of the lazaretto, with part of his family, and the priest who attended the sick, were also taken ill and died."

From the lazaretto the disease made its way into the city, and began to appear about the 20th of June. By what means it was introduced is not directly said; but it seems to have been by smuggling infected goods. In the beginning of July it began to spread; but a kind of pause having taken place between the 12th and 23d, the physicians were reproached with having mistaken the distemper. During this supposed interval, however,
it

it was discovered on the 18th of July that the disease had spread in a certain part of the city. A surgeon, employed to examine into the matter, declared the distemper to be the worm-fever; and about the 23d the council of health were informed of the death of fourteen persons in that quarter, and of several others falling sick. The surgeon still adhered to his opinion, but a physician declared it to be the true plague. About the end of the month it had got into the suburbs; four physicians declared it to be the true plague, but their report was not believed; they were insulted in the streets, and it was not until some of the inhabitants of better rank were taken ill, that the true state of the matter gained credit.

“Such (says Dr. Ruffel) was the rise of the plague
 “at first, and its progress afterwards in the months of
 “June and July; whence it appears, that persons on
 “board the suspected ship, those employed in airing the
 “goods, a surgeon and a priest, who attended the sick,
 “were among the first infected; that the passengers
 “from the several ships, all of which ships, the first
 “excepted, brought foul patents, were, together with
 “their baggage, admitted into the city, after performing
 “a quarantine of little more than eighteen days; that
 “the distemper from the 20th of June till towards the
 “end of July advanced very slowly, and sometimes seem-
 “ed to pause; that it attacked chiefly the poorer sort of
 “people, and was found in distinct quarters of the city;
 “and lastly, that, *during the first forty days, few or none of*
 “*the infected recovered*; a circumstance entirely conso-
 “nant to what was observed in the beginning of the
 “plague at Aleppo.”

Three other facts are mentioned by our author, viz. that the disease was evidently communicated by infection; that those who were careful to seclude themselves from all communication with the sick and with infected goods, were not infected; and lastly, that the disease, which began to rage violently in August, continued to do so through that and the following month, but declined fast in the months of October and November,

ber, and seemed to cease in the middle of winter. Some accidents happened in 1721, between the months of February and July, which gave occasional alarm; but the distemper did not spread, and ceased entirely after the summer solstice of that year.

To all this, however, objections have been made. 1. That the irregular seasons of the former year, a bad crop, and unwholesome aliment, had produced a malignant epidemic, all which, joined to the popular dread of contagion, were sufficient to produce the plague without any imported infection. To this Dr. Ruffel replies, that these positions, assumed as facts, had no existence; for which he refers to the publications of the times.

2. It was objected that there were instances of the plague in Marseilles before the 25th of May. These instances are only five in number, produced by M. Deidier, "who saw not the cases himself, yet (says Dr. Ruffel) from the very imperfect accounts he had been able to glean, he thought himself justified in declaring they bore all the marks of the true plague. Nothing (adds the Doctor) but extreme partiality to an hypothesis could have led any one practised in the plague, into such a declaration; the cases bearing every internal mark of belonging to a different class from the plague. I shall endeavour to show this in a few words.

"Of the five supposed infected patients, three recovered, two died, and all had eruptions. One who died had a parotis (the most ambiguous of all pestilential tumours) without any concurrence, so far as appears, of pestilential symptoms. The tumour had appeared six days before the woman's death, but how long she had been sick remains unknown. The other died the 16th or 17th day, a very unusual period in the plague. She also had a parotis, which did not make its appearance till the 10th or 11th day of the disease. No pestilential symptoms whatever are mentioned. Of the three who recovered, one was very ill with a fever and carbuncle; but neither the invasion nor the duration of the disease are mentioned. Another had a carbuncle and a small tumour on the thigh;

“ thigh ; and the third (which bears the nearest resemblance to a very slight infection) had also a bubo in the thigh ; but the tumours in neither of these patients are described in such a manner as distinguishes them from ordinary tumours ; and the apothecary, who gives the account from memory, had in all likelihood never seen a pestilential bubo before.”

“ Of the persons infected for some time after the arrival of the ships from the Levant, none had eruptions, and all perished after a few days illness ; which agrees entirely with what was observed at Aleppo in the beginning of the plague : hardly any of the sick recovered, and the major part died in three or four days, without any appearance of buboes. Upon the whole, therefore, I think it very clearly established, that the plague did not exist in France before the month of May, 1720. Prior to M. Deidier, however, I find a M. Pons had endeavoured to prove that the plague was in Marseilles, not only before the month of May 1720, but even in the preceding year. I have not had an opportunity of examining that gentleman’s book.”

3. It is objected that the disease was not brought from the Levant by infected goods. “ Captain Chataud’s vessel, supposed to have brought the infected goods, arrived with a clean patent, or bill of health, having left the coast of Syria before the plague broke out there ; she consequently cannot reasonably be thought to have transported the plague, which was not in the ports from whence she came.”

To this Dr. Ruffel answers, that on commercial accounts the Turks carefully conceal the appearance of the plague from the Europeans. Should reports of accidents get abroad, they are variously and contradictorily represented, and pestilential marks and tumours fraudulently concealed. Though Chataud obtained a clean patent, the plague broke out soon after his departure, and three vessels with foul patents arrived at Marseilles a few days after Chataud. “ To this (says Dr. Ruffel) it may be further added, that, notwithstanding

“standing his clean patent, persons acquainted with the
“Levant will think it far from improbable, that the
“plague might actually have been in Sidon when he
“sailed, though unknown to the magistrate, by whom
“the patents are granted. . . . A clean bill of health
“imports that the place has been free from plague, and
“all suspicion of plague, for a certain space of time; but
“the clean patents of the two first arriving from the
“Levant, after the cessation of the plague, are, according
“to Mr. Howard, deemed foul at Marseilles, and the
“passengers are obliged to perform a quarantine of thirty-
“one days. The French consuls lying under an obli-
“gation to insert in their patents a detail of circum-
“stances, it must appear strange, when the condition of
“Syria at that time is considered, how Captain Chataud
“should have obtained a clean patent.”

Though this must certainly be deemed a sufficient answer to the objection, Dr. Russel goes on to give an account of what had happened the preceding year, when the plague had raged violently at Aleppo; and shows that, from the condition of the whole coast of Syria, a return of the plague was certainly to be expected; that the French consuls could not be ignorant of this, neither could the council of health at Marseilles be unacquainted with what had happened at Aleppo the preceding year. “The facility with which the patents
“seem to have been issued in Turkey, and the partial
“indulgence of the council to Chataud’s ship, notwith-
“standing the very extraordinary mortality which had
“avowedly happened on the voyage, together with their
“easy confidence afterwards in the reports of the surgeon
“of the lazaretto, can only be accounted for from the
“prevailing influence of private commercial interest over
“a sense of official duty.”

Our author next proceeds to take notice of what happened during this ship’s voyage to Marseilles. On the 31st of January he left the coast of Syria with a clean patent, before the plague broke out. On the 25th of May he arrived at Marseilles, from Sidon, Tripoli and Cyprus. On the voyage, or at Leghorn, he lost six of
Li the

the crew ; but, by the certificates of the physicians of health at Leghorn, these died only of *malignant fever caused by unwholesome provisions*. These last words in the *Traite de la Peste* are said to have been interpolated at Marseilles. At any rate, as Dr. Ruffel observes, they could relate only to those who died at Leghorn, not to the others, whom the physicians had not seen.

The other account is much less favourable. According to it, Chataud “ left Sidon the 31st of January with
 “ a clean patent. The plague discovered itself there
 “ a few days after his departure. Having sustained some
 “ damage by bad weather, he put into Tripoli, where he
 “ embarked some merchandise ; he took in also some
 “ Turks, passengers for Cyprus, together with their luggage. Soon after the ship had left Tripoli, one of
 “ these passengers fell sick and died. Two of the sailors
 “ employed to throw the corpse overboard desisted at the
 “ desire of the pilot, and the rest of the ceremony was
 “ performed by the other Mahommedan passengers ;
 “ the ropes with which the body was lowered down, being by way of precaution thrown into the sea. Within
 “ in a few days the two sailors who had handled the
 “ corpse were taken sick and died. At Cyprus the ship
 “ put her remaining passengers on shore, and made a
 “ very short stay. Soon after her departure from that
 “ island, a third sailor and the surgeon died of an illness
 “ of a few days duration. The captain, justly alarmed
 “ by these accidents, ordered the bedding and other
 “ things used by the deceased to be thrown into the
 “ sea ; and kept himself carefully separate from the
 “ crew during the remainder of his voyage. Some time
 “ after this three more sailors fell sick, and, there being
 “ no surgeon on board, the vessel put into Leghorn,
 “ where the three sick men died, and the physician and
 “ surgeon of the lazaretto declared the disease to be a
 “ malignant pestilential fever.”

Our author considers the above account as a full proof of the plague being imported by Chataud's vessel : he declines entering into the question about the possibility of importing contagion in merchandise. How
 this

this *might* take place has already been explained ; and the present instance of its having been imported is as clearly proved as can be expected. A collateral proof, with regard to the contagion of the small-pox, we have from Dr. Huxham. A beggar, ill of that disease, approached a certain town in England, but was not suffered to enter, for fear of infection. The beggar died, and the infected clothes were burnt at some distance from the town ; but the smoke being blown upon it by the wind, the small-pox in a short time made its appearance, beginning in that part upon which the smoke was blown. This clearly proves that *one* species of contagion may adhere to clothes, and is a very strong presumption that any other may do the same. It also shows that contagion, when once produced, is by no means easily destroyed ; and consequently that all kinds of purification, even when used with the utmost care and diligence, are scarce sufficient to ensure safety.

It would now be superfluous to enter farther into the subject of the plague being communicated by infected goods, did not our author quote a work of Dr. Pye of London, in which the latter from the very *Journal* (which has been used as containing arguments in favour of contagion) makes inferences directly opposite. “ The facts
“ related in this journal (says Dr. Pye) seemed to me
“ to make so clearly against the modern doctrine of con-
“ tagion, that if this writer had not mentioned them as
“ undeniable instances in his favour, I should not have
“ thought there had been any persons here in England so
“ dull of understanding, or so much blinded with pre-
“ judice, as to stand in need of having these facts put
“ into a more obvious light : but, having this occasion,
“ I shall consider them more largely than otherwise I
“ would have done, and show that the porters, who di-
“ ed in the lazaretto at Marseilles, received no hurt or
“ infection from the goods.

“ To leave no room for objection, I shall take notice,
“ that a guard of quarantine died on board Chataud’s
“ ship the 12th of June ; but, as this officer was no
“ ways concerned either in unloading or opening the
“ goods,

“ goods, he could receive no hurt from them ; and be-
 “ sides, this must have been fourteen or fifteen days af-
 “ ter the goods had been carried out of the ship into
 “ the lazaretto. Further, six of their men are said to
 “ die at Leghorn ; but the town of Leghorn was not in-
 “ fected from thence, which would have been more
 “ likely if there had been any infection in the case, than
 “ that Marseilles should be afterwards infected.

“ If any infection or infectious *aura* can be supposed
 “ to be packed up, and brought in goods, such infection
 “ or infectious aura must necessarily issue forth from
 “ them in greatest abundance, and with the greatest
 “ force, at the first opening or unpacking of them ; and,
 “ as it must continue to fly off every moment, and be
 “ thereby continually diminishing, it is likewise cer-
 “ tain, that in a very few days the goods must be in a
 “ great measure, if not entirely, cleared of it. Where-
 “ fore, if the porters could have been infected from the
 “ goods at all, it must have been at the first opening of
 “ them : but, even according to this journal, the porters
 “ that first fell sick were not taken ill before the 23d of
 “ June, whereas Chataud’s ship arrived the 25th of May
 “ preceding ; so that the goods of that ship, in purifying
 “ which the porter first mentioned was employed, had
 “ been airing and purifying for twenty-six or twenty-
 “ eight days before this accident happened ; and it can-
 “ not be conceived that after so long a time they should
 “ not have been entirely purged of all infection or infec-
 “ tious aura, if any could have been brought with them.
 “ Or if it can be supposed, which I think impossible, that
 “ any part might still be left, it must withal be supposed
 “ so much less than at first, as not to be capable of doing,
 “ those porters especially, the least hurt : to suppose
 “ otherwise would be to argue that the same man who
 “ some days before had received and borne a very great
 “ quantity and force without any injury, could then be
 “ killed by a quantity and force infinitely less.

“ According to the report of merchants, *Frenchmen*
 “ are not subject to the plague in Turkey ; and it cannot
 “ be conceived that so small a quantity of infectious air

“ as can be packed up and brought in a bale of goods,
“ should destroy them in France, or in an air and cli-
“ mate distant and different; when the whole atmo-
“ sphere of the same infectious air is found not to injure
“ them in very infected places, and wherein it is al-
“ lowed to be bred and generated.”

Thus far Dr Pye.—Let us now hear Dr. Russel in answer.

“ The death of the quarantine officer was mentioned
“ in order to leave no room for objection; but still it
“ may be objected that he has omitted the death of
“ the sailor on the 27th of May, and asserted, in con-
“ tradiction to the journal, that the former six sailors
“ died at Leghorn. That Leghorn was more likely to
“ be infected than Marseilles, is a strange notion. The
“ ship had landed no goods there, nor had any inter-
“ course with the shore; for the physician who visits
“ the sick on board, remains at a distance from the ship,
“ in a boat, and the dead bodies are sunk in the sea.
“ As to the circumstance of the goods of Chataud’s ves-
“ sel being all in the lazaretto before the 12th of June,
“ it is a supposition to be attributed to Dr. Pye’s un-
“ acquaintance with matters of that kind; for it is im-
“ possible a ship which arrived the 25th of May should
“ discharge the whole of her cargo in two or three days.
“ The dispatch would have been miraculous, consider-
“ ing the ship lay near two leagues from the lazaretto,
“ and was unloaded, and the boats navigated, by her
“ own crew. It did not occur to Dr. Pye, that some
“ time, previous to the vessels beginning to unload, is
“ taken up in examination and other forms at *Pomague*,
“ and the council of health. The loss of six men on the
“ voyage was an extraordinary circumstance, that re-
“ quired deliberation; and it appears that on the 29th,
“ after the death of the sailor on board Chataud’s ves-
“ sel, the council determined the quarantine of his
“ cargo to be forty days, commencing from the landing
“ of the last bale; which was double the time usually
“ allowed for a ship with a clean patent. It is very
“ probable, therefore, that the ship did not begin to
“ unload

“ unload till after the 29th of May, and possibly had
 “ not finished when the quarantine officer died, the 12th
 “ of June, who must have been taken ill two or three
 “ days before.

“ In regard to the time requisite for the complete
 “ evaporation of the infectious aura, in what propor-
 “ tionate gradation its activity is impaired by ventila-
 “ tion, and the specific quantity required to produce
 “ effect on the human body, they are matters which I
 “ apprehend will not readily be admitted to be clearly
 “ and certainly known. That the first porters were
 “ not taken ill before the 23d of June, is very true;
 “ but that the goods had been airing and purifying for
 “ twenty-six or twenty-eight days, has been shown above
 “ to be an error. The Doctor also makes two other
 “ suppositions equally erroneous. The first, that the
 “ whole of the cotton contained in a number of bales
 “ is equally imbued with infectious aura; the second,
 “ that all the bales of a ship's cargo are opened nearly
 “ about the same time. But, as the cotton contained
 “ in these bales may not only have been collected from
 “ different villages at different times, but packed up
 “ under various circumstances relative to the materials
 “ used for embalage, and the persons employed in em-
 “ baling or steaving them; it may easily be conceived
 “ how the cargo of a ship, coming even from a place
 “ where the plague actually rages, may be only par-
 “ tially infected, or not infected at all. The warmest
 “ advocate for contagion never contended for every
 “ bale of a ship's cargo being equally infectious. As
 “ to the airing of the bales, it is a laborious and a
 “ tedious process. Where there is a considerable
 “ number, it takes up several days to open and arrange
 “ them, goods of different kinds must be disposed sepa-
 “ rately, accounts taken, and the cordage, &c. laid up
 “ with care where it may be found again. The labori-
 “ ous part of these operations is performed by the porters,
 “ who also transport the goods from the water side to the
 “ enclosure where they are to be aired: and, as the days
 “ of quarantine do not begin to be reckoned till all the
 “ goods

“goods are landed, the porters for some days at the beginning are sufficiently employed in receiving and arranging the cargo, that being the business requiring the first dispatch. When these circumstances are considered, it will appear no extravagant supposition, that some of the last opened bales of Chataud’s cargo might still retain enough of infectious aura to infect the porter on the 23d of June. To set this retardment, almost unavoidable in the opening of bales, in a still clearer light, it should be observed, that, by the regulations at Marseilles, all suspected goods are subject to what is termed *seraines* ; that is, a certain number of bales are taken out of the hold, and, being opened at both ends, are exposed to the air for two, three, or six days, by way of trial, in order to see if any signs of infection should appear among those employed in handling the merchandise. When these have been aired, more or less, according to circumstances, another parcel is opened and exposed to ventilation in like manner : so that, according to the burden of the ship, there may be several of these *seraines*, each of several days duration. In this manner, independent of accidental impediments from wind and weather, in sending the goods from the ship, it may be supposed, were it at all necessary to make the supposition, that the porters, not only on the 23d of June, but on the 7th and 8th of July, were infected upon opening some new bales. As to the porter being infected by goods from another ship, Dr. Pye thinks it impossible, because the ship had been twelve days in port, and the goods must have been eight or nine days in airing and purifying : had he been acquainted with the practice of the *seraines* in quarantine, he would have been at no loss to make the accident agree exactly with his notion of the infectious aura. . . . The plain matter of fact, as it stands in the journal, is this, that six porters, employed in purifying suspected merchandise from the Levant, died of the plague ; and their death was followed by that of the surgeon who attended them, and part of his family.”

From

From this the reader will be able to judge how far the question is decided in favour of the fact that the plague at Marseilles was actually produced by imported contagion. It seems needless to follow our author through his investigation of those facts which his adversaries have misrepresented; for these must of course be in his favour; every misrepresentation by a disputant being plainly an abandonment of his cause. Indeed the argument against contagion at that time was properly but *one*, and is set forth in no stronger language now than formerly. Even as long ago as 1665 Dr. Ruffel quotes one Gadbury an astrologer stating the difficulty as strongly, and giving a solution of it as clearly, upon *his* principles, as the best modern theorists can do upon *theirs*. “If the pestilence, (says Mr. Gadbury) be infectious, and really catching in itself, it must be so equally to all persons that approach it, or that it approacheth; or else it must be infectious to some particular persons only. If it be infectious to all persons, or catching to all alike, then all persons, that come into the sight or within the scent of it, must necessarily be subject unto it. If not infectious unto all, but unto some particular persons only, I say then it ought not to be deemed or esteemed infectious at all, at least not any more infectious than are all other diseases, viz. small-pox, scurvy, pleurisy, ague, gout, &c. since (though the notion of infection be laid aside) there is not a person born into the world that hath not at some time of his life (as his *nativity* shall truly show) some one disease or other. Never was any person subject to violent diseases, as plague, &c. but had a violent *nativity* to show it, and *e contra*.”

The answer to this has been already given.—Let any other cause than contagion or infection be supposed, and the difficulty remains equally great. The probability is in favour of contagion, rather than a general disposition of the atmosphere, because in the latter case the disease would, contrary to experience, begin in a great many places at once; but the plague begins in such a secret manner that we scarce know whence it comes. Like fire, or a ferment in liquors, it diffuses itself far and wide, and lastly,

lastly, like an immense inundation, the source of which is dried up, it seems to lose its power by extending too far, and dies away altogether. We cannot penetrate into the causes of those things, but, without any speculation at all, we can observe that the disease falls upon people of a certain constitution more than others, and this may be of use in preserving ourselves from it, as shall be explained in the next section.

It is still necessary to say something of the infection spreading from one person to another, and being kept off by refraining from communication with the diseased. This indeed naturally follows from its proceeding originally from the cotton: for as all the infected did not touch this cotton, there can be no other cause assigned from its spreading than by communication from one to another; and, therefore, if such communication was cut off, we should naturally think that the disease would not spread. But, in opposition to this, we have already quoted Dr. Moseley giving a long list of convents infected, though they kept themselves strictly shut up. Dr. Rufel cites, in favour of prevention by shutting up, two certificates, one by the bishop of Marseilles, the other by the sheriff of the same place. To these he adds the testimony of M. Langeron, who was actively employed throughout the whole time that the plague continued, first as a commodore of the galleys, and afterwards as governor of the town and its dependencies. In opposition to these, however, he takes notice of two passages "in books of acknowledged authority," which he is at pains to answer; the one is from the Journal already quoted, which says, "and what is unaccountable, those who have shut themselves up most securely in their own houses, and are the most careful to take in nothing without the most exact precautions, are attacked there by the plague, which creeps in no one knows how." The other passage is taken from the *Relation Historique*, "that, in the height of the pestilence, the infection penetrated into places which had till then remained inaccessible; that monasteries and houses shut up in the most exact manner were no longer places of security."

To the former of these our author answers, that “ from
 “ the manner of stating the case, one would think that
 “ all these religious had been close shut up, without any
 “ communication with persons without doors ; and this
 “ was certainly intended by an author who has made
 “ remarks upon it ; but it will be found, upon looking
 “ into the beginning of the very paragraph cited, that
 “ the greatest part of them are represented as martyrs
 “ who had meritoriously exposed themselves. Of the
 “ twelve different orders mentioned on this occasion,
 “ the Grand Augustines only are said to have kept in
 “ their convent. But, supposing the Augustin convent
 “ to have been actually shut up, and in that state in-
 “ fected ; it would by no means invalidate the instances
 “ brought of the preservation of the convents, the cer-
 “ tificates concerning which were granted deliberately,
 “ after all was over ; whereas the journal, written from
 “ day to day, marking circumstances rapidly as they
 “ occurred, the author, amongst various other affairs, had
 “ not always leisure or opportunity to examine minutely
 “ into circumstances. It is in this light I am inclined
 “ to consider the houses being infected which took in
 “ nothing without the most exact precautions ; and the
 “ rather, because I met with several instances of the like
 “ kind at Aleppo, in the houses of the Christian and
 “ Jewish nations : but in the sequel it generally appear-
 “ ed there had been some improper communication car-
 “ ried on by the domestics, unknown to the family at
 “ the time.

“ That the atmosphere, in a city so dreadfully cir-
 “ cumstanced as Marseilles, may become so highly
 “ tainted as to convey the plague into houses shut up,
 “ cannot consistently be affirmed to be impossible, by
 “ those who hold mediate contagion ; and the concur-
 “ rence of circumstances at that period in Marseilles, ren-
 “ ders it highly probable that such accidents happened.
 “ But, in general, the pestiferous effluvia once emitted
 “ into the air, do not appear to operate at any great
 “ distance from their source ; and M. Deidier asserts,
 “ that two monasteries (from their situation, one near a
 “ burial

“burial ground, the other near a pest-house) very dangerously situated, remained nevertheless untouched, which he thinks an argument against infection being conveyed by the air.”

From this long and contested account of the manner in which the plague was received into Marseilles, we see how very difficult it must be to come at a true state of facts, when a number of people think it their interest to misrepresent or conceal them. The limits of this treatise will not allow us to follow our author through the numerous details of misrepresentations and unfair methods which the adversaries of the doctrine of contagion have made use of to establish their opinion: neither shall we enter into any discussion concerning the origin of other plagues, as we should in them find the same opposite kinds of evidence without such documents for distinguishing the true from the false as Dr. Ruffel has produced in the case of Marseilles. A single fact only, mentioned by Mr. Howard in his *Treatise on Lazarettos*, shall be related, and which, if allowed to be *fact*, decides the question as effectually as a thousand.

“When the plague raged at London in 1665, it was conveyed to the remote village of Eyam near Tideswell in Derbyshire. In this place it broke out in September 1665, and continued its ravages upwards of a year, when two hundred and fifty of the inhabitants had died of it. The worthy rector, Mr. Mompeffon, whose name may rank with those of Cardinal Borromeo of Milan, and the good bishop of Marseilles, at its breaking out, resolved not to quit his parishioners, but used every argument with his wife to quit the infected spot. She, however, refused to forsake her husband, and is supposed to have died of the plague. They sent away their children. Mr. Mompeffon constantly employed himself, during the dreadful visitation, in his pastoral office, and preached to his flock in a field, where nature had formed a sort of alcove in a rock, which place still retains the appellation of a church. He survived, and the entries in the parish register relative to this calamity are in his own hand writing, viz.

In

In 1665,	Sept.	Died 6	1666, May	Died 5
	Oct.	22	June	20
	Nov.	5	July	53
	Dec.	7	Aug.	78
1666	Jan.	3	Sept.	14
	Feb.	5	Oct.	17
	March	2	Nov.	1
	April	12		

This plague is said to have arisen from a box of clothes sent from London while the distemper was at its height in that city. But whether this be admitted or not, it cannot well be supposed that in a small village there could either be a peculiar constitution of the air, collections of filth, immoderate heat, cold, or in short any general cause from which a plague could be supposed to arise, that would not have affected the country for a great way round. How then came this insulated spot to be so violently affected, except by contagion? No matter whether by clothes or any thing else. The very particular manner in which the numbers who died are recorded, leaves no doubt as to the fact of the distemper having been there; neither is it possible to account for its rise on any other principle than contagion.

Mr. Howard, previous to his going abroad, had been furnished, by Dr. Aikin and Dr. Jebb, with a set of queries relative to the plague, to be put to the physicians in the different countries through which he travelled. This commission he executed with great fidelity and exactness. The physicians to whom he proposed them were, *Raymond* of Marseilles, physician; *Demollins* of do. surgeon; *Giovanelli*, physician to the lazaretto at Leghorn; *They*, to do. at Malta; *Morandi*, physician at Venice; *Verdoni*, at Trieste; *Jew* physician at Smyrna; *Fra. Luigi di Pavia*, prior to the hospital of San Antonio at Smyrna. The questions proposed were as follow:

1. Is the infection of the plague frequently received by the French?

Though

Though this was not asking in direct terms whether the plague is infectious or not, all to whom it was proposed seem to have viewed it in this light, Raymond of Marseilles only excepted, who answered directly, "Sometimes it is." All the rest, except Giovanelli, agreed that it might be communicated by the touch, or by the breath. Verdoni gave an instance of its being communicated by a flower which three persons smelt at; two remained free, but the third sickened and died in twenty-four hours.

2. Does the plague ever rise spontaneously?

In this Verdoni alone answered positively in favour of the spontaneous rise of the plague. *They* spoke ambiguously.

3. To what distance is the air infected? How far does actual contact, wearing infected clothes, or touching other things, produce the disease?

To this question Verdoni answered in a manner seemingly inconsistent with his former answer; allowing not only that the plague was infectious, but that infected things might communicate the disease after an interval of many years. All agreed that the strength of the infection was greater or less according to circumstances; the distance at which it could act was likewise uncertain. Raymond said that the sick might be safely conversed with, across a barrier, at a few paces distance; the Jew said at *two ells* distance, provided the chamber windows be not all shut. Giovanelli said it had been proved that the infection did not extend beyond five geometrical paces. The touch of infected clothes, or drawing in the breath of the sick, was looked upon by him and Fra. Luigi to be very dangerous.

4. What are the seasons in which the plague chiefly appears; and what is the interval between the infection and the disease?

To this it was answered by Raymond, that the two solstices are the times in which it has least power. The others agreed that hot and moist weather was favourable to its ravages; the spring, summer and first month of autumn are dreaded. These circumstances, however,
must

must be variable in different countries. As to the time in which the infection shows itself, the answer was various. According to *They*, it "sometimes acts slowly, sometimes like a *stroke of lightning*." According to Verdoni, "the disease generally shows itself at the instant of touch, *like an electrical shock*." Sometimes the infection will be communicated from a sick person to a sound one, who without any disease may communicate it to a second, and that second to a third, in whom alone it would become active.

The other questions, relative to the symptoms, prevention and cure of the distemper, will be taken notice of in the course of the treatise. In the mean time having discussed, with a prolixity almost exceeding our bounds, such preliminaries as seemed most likely to throw some light on the nature of the distemper, we shall now proceed to the medical history of the plague, as we find it laid down in different authors.

Though this distemper has most frequently been accounted a *fever* in the highest degree, yet, as we have already noticed, it seems to be essentially different.* The testimonies there quoted are sufficient to establish the fact; and, were it needful, many others might be brought from authors both ancient and modern. In the plague said to have taken place in the days of Romulus,† Plutarch relates, that the people died without any sickness. To this very ancient testimony we shall add that of Dr. Patrick Ruffel, who closes the account of his first class of patients with the following paragraph: "That the plague, under a form of all others the most destructive, exists without its characteristic eruptions, or other external marks reckoned pestilential, can admit of no doubt; and it is to be regretted that mankind have so often, from the absence of these, been betrayed into errors of fatal consequence on its first invasion; at which early period human prudence can only be exerted in the way of defence with any probability of success."

The

* See p. 102 *et seq.*

† P. 10, note.

The symptoms of this fatal disease were sometimes a sudden loss of strength, confusion or weight in the head, giddiness at intervals, oppression about the præcordia, dejection of spirits, taciturnity, an anxious aspect, but without any symptoms of fever. In these, death ensued within twenty-four hours; some were said to have died within a few hours, but our author saw none of these, and is inclined to doubt the truth of the accounts, having in several instances, where this is said to have happened, found upon inquiry that matters had been inaccurately stated, and that the patients had really been ill one or two days.

In others the disorder was more perceptible. In a few hours the eyes became muddy, the surface of the body cold, with drowsiness, lethargy, and pain at the heart. In the progress of the distemper they frequently lost the power of speech, the skin seldom recovered its warmth, or, if it did, it was only by irregular flushings. The pulse sometimes remained nearly in its natural state, but was, for the most part, low and quick. They were "by turns delirious, confused and sensible, but the comatose disposition was most prevalent. Towards the end they suffered extreme inquietude. Vomiting in some occurred the first night; in others a diarrhœa next day; both accelerating the fatal period; but these symptoms were less frequent than in some of the other classes. Buboes appeared only in a very few who survived the third day. . . . The total absence of buboes in such patients as perished suddenly I have no doubt of, nor of their being in general very rare in others of this class; though I suspect that the buboes might sometimes have been concealed, where the disease ran out to the fourth or fifth day, and for the same reason that the reports concerning the state of the corpse were sometimes not true. . . . It was very rare to find suspicious marks of infection on the bodies [of those who died within 24 hours] . . . Carbuncles were seldom visible till the month of May, which was later than this form of the disease. It prevailed chiefly at the rise of the plague in 1760, and
its

“ its revival in the two succeeding years, decreasing as
 “ the distemper spread ; and though they were found
 “ dispersed in every stage of the pestilential season, yet
 “ the number of this class was proportionably small,
 “ compared with that of others. Petechiæ, vibices, or
 “ broad, livid, roundish spots, occurred sometimes, but
 “ were not common, and the two latter were seldom vi-
 “ sible till after death.”

This account of the most malignant form of the pestilence differs considerably from that of Dr. Hodges, who seems to think that the *tokens*, as he calls them, very generally were to be found on the bodies of those who died suddenly. He mentions indeed a young man who was suddenly seized with a violent palpitation of the heart, and thus continued till his death, which took place in a few hours. In this case the Doctor supposed that there might be a carbuncle broke out on the heart. Dr. Ruffel has considered the description of the tokens given by Dr. Hodges, and compared it with that of others called by Diemerbroeck *maculæ mortis*, *spots* or *tokens of death* ; and by this comparison it appears that the former has spoken somewhat indistinctly on the subject, confounding two different kinds of eruptions together. Dr. Hodges, however, as we have already seen (p. 10) asserts, in his *Leimologia*, that the tokens rise from within, and are broadest at their bases, where he also supposes the pestilential poison chiefly to lie. To the same purpose, in his Letter to a Person of Quality he says,
 “ The tokens have their original and rise from within,
 “ and afterwards externally show themselves ; which is
 “ evident, because the basis of them is larger than their
 “ outward appearance, and the internal parts are found
 “ very often spotted, when there is no discoloration
 “ visible on the skin.” Dr. Ruffel, after quoting Diemerbroeck, makes the following observations : “ The
 “ author (Diemerbroeck) is diffuse on this subject, and
 “ thinks it a mistaken though prevalent notion, that the
 “ maculæ are merely superficial in the skin, proceeding
 “ from putrefaction, ebullition, &c. in the blood or humours : on the contrary he affirms, they arise from the
 “ internal.

“ internal parts, even the periossteum, broad at the base, “ and tapering to their termination in the skin, being “ produced by the *extinction* and *extravasation* of the vital spirits. Now (says Dr. Ruffel) this answers exactly to one species of the tokens described by Hodges, “ which therefore may be reckoned the same with the “ *maculæ mortis*, and was probably the only one observed “ at Nimeguen,” &c. On the same subject he quotes a book entitled *Medela Pessis*, in which the author says that by careful dissection the *tokens* may be traced half-way deep in the flesh, and some, in the muscles of the breast, have been followed by the incision knife even to the bone. By the directions given by authority to the searachers in 1665, they were ordered to look narrowly for these tokens, which were described as “ spots arising on “ the skin, chiefly about the breast and back, but sometimes also in other parts. Their colour is something “ various, sometimes more reddish, sometimes inclining “ a little towards a faint blue, and sometimes a brownish “ mixed with blue ; the red ones have often a brownish “ circle about them, the brownish a reddish.”

On the subject of tokens Dr. Hodges further observes, that they differed also in their degrees of hardness, some being easily penetrated with a needle or penknife, while others, more callous or horny, were penetrated with more difficulty. They so strongly resembled warts, that they could scarce be distinguished from them ; and Dr. Hodges himself was often obliged to have recourse to a needle for this purpose. They seemed hard to the touch, not unlike kernels under the skin, the superficies being smooth. “ When I essayed to prove some of them (says he) I found them *almost impenetrable*.” Another very remarkable circumstance relative to them was, that they were often quite insensible, and this distinguished them from the carbuncle, which is always very painful. Hodges also remarks, that a quick sensibility in the skin was always a good sign, and those that went no farther than the skin would sometimes slough off.

Along with these tokens we can scarce doubt that *petechiæ* and *vibices* made their appearance. The former, even in the inferior degrees of the distemper, were dangerous, the latter always fatal, never appearing till the patient is within a few hours of death, sometimes indeed not till death has taken place. Of the *petechiæ* Dr. Ruffel says, that for the most part they predicted death, but not without exception. Such as he observed were round, somewhat smaller than a recent flea-bite. They were distinct, few in number, and scattered irregularly about the breast and mastoid muscles. When they did not appear till the approach of death, they were from the first livid, or very dusky; but if they appeared early, they were of a less deep colour, changing afterwards to livid. Hodges speaks of them as deeper coloured than the spots of malignant fever, not fixed in any particular spot, sometimes few, but commonly very numerous; the colour sometimes red or purple, sometimes yellow, and sometimes livid or black. From Gotwald, Ruffel quotes a description of these spots, which he divides into four species. 1. Reddish, like flea-bites, soon growing brown or black; appearing on all parts of the body except the face. 2. In the form of lentils, spreading like the former all over the body; ruddy at first, but in 24 hours growing dark or ash-coloured. 3. Large brown spots, scattered here and there, sometimes intermixed with the lentil kind. 4. Not unlike the measles, spreading all over the body, rising afterwards in small blisters without any matter, vanishing about the fifth day. Ruffel also takes notice of a species of *petechiæ* which were very numerous, confluent, and of a dark red or dusky colour and irregular figure. These were sometimes remarked in the interstices of the former. Such instances occurred but rarely.

The *vibices* were much larger than the *petechiæ*. Gotwald says that they covered the face as high as the nose, and from thence spread to the forehead, disfiguring the patient in a frightful manner. They did not appear till a short time before death. Often they appeared unexpectedly, shooting up like lightning from the breast to the face, in spots of various colours, blue, green, brown
and

and yellow. Diemerbroeck describes them as oblong spots of a livid or black colour, like strokes drawn with a pen; sometimes they were larger, the biggest resembling the strokes of a whip. Ruffel takes notice of a kind of marbled appearance which took place at the height of the disease, or a few hours before death; the colours being a faint blue, and darkish red, both more or less obscure at times, but never bright. It was not permanent, vanishing in one place, without leaving any trace, and returning at short intervals. "The skin in various places was sometimes deformed by narrow streaks of reddish purple, or livid colour. When such took possession of the face they gave a frightful appearance to the countenance, and frequently made such an alteration in the features, and so completely disguised the patient, as to render him hardly *knowable* by his acquaintance. A streak nearly of the same kind was sometimes observed darting from the edges of the buboes and carbuncles. The vibices or weals were much longer and broader, and more exactly resembled the marks left in the fleshy parts by blows or stripes; they were found chiefly on the thighs, buttock, and back, and made their appearance several hours before death, in some cases, but in others not till after. Large blue or purple spots, the *macule magnæ* of authors, were sometimes observed with or without the vibices, a little while before the patient expired, but most commonly were discovered only on the corpse. Their figure in general was round, sometimes irregular."

Whether all these mortal signs appeared on such as died very suddenly of plagues, and were by the English writers confounded under the general name of *tokens*, cannot certainly be determined. Dr. Ruffel saw none who died within the twenty-four hours, and few who died within thirty hours, so that we cannot from him expect any particular account of the situation of those who died suddenly. In general, however, he says, that "in the most destructive forms of the plague, the vital principle seems to be suddenly, as it were, extinguished, or else enfeebled to a degree capable only for a short
" while

“ while to resist the violence of the disease ; in the sub-
 “ ordinate forms, the vital and animal functions, vari-
 “ ously affected, are carried on in a defective, disorderly
 “ manner, and denote more or less danger accordingly.”
 It seems probable therefore that in those who are sudden-
 ly killed, the same effects take place in a short time which
 are observed to take place after a longer space in those
 who die gradually, buboes only excepted, which require
 for their formation a longer time than is allowed to the
 patient to live. Internal mortifications, or rather eschars,
 are therefore to be suspected, and dissections have evinced
 that this was really the case ; but besides these there
 was an appearance observed in the plague at Marseilles
 which is not taken notice of by former physicians ; viz.
 a preternatural enlargement of the heart. M. Deider
 on that occasion communicated an account of nine dis-
 sections, but of these only one had died without erup-
 tions. This was a woman of 40 years of age, who lived
 till the third day. In her “ the mediastinum* was torn
 “ towards the upper part ; the pericardium of a livid co-
 “ lour ; the heart larger than in its natural state, by the
 “ swelling of its ventricles ; full of thick, black blood.
 “ The liver was also very large, and of a livid colour, with
 “ a carbuncular pustule on the side of the gall-bladder,
 “ which was filled with very black bile.” In others
 who had eruptions, and who of consequence we must
 suppose to have lived longer, the enlargement of the
 heart was still more remarkable. In one who lived
 eleven days, the heart was of double the bigness, having
 scarce any blood in the ventricles, whose cavities were
 filled each with a large polypus, that on the right side
 having dilated the auricle to the breadth of four inches.
 The liver also was larger than ordinary, and the gall-
 bladder full of a black and green bile. The appearances
 were much the same in all the rest ; but, as the time
 they

* The Mediastinum is a membrane by which the cavity of the breast is lon-
 gitudinally divided. The tearing of it in any disease seems altogether unac-
 countable, unless we suppose an extraordinary loss of cohesion to have taken
 place without any mortification. The pericardium is a membrane surround-
 ing the heart, and in a natural state contains some water, condensed from va-
 pour after death.

they sustained the disease is not mentioned, we cannot determine whether the enlargement of the heart took place at the very first, or was only an adventitious symptom after the fever had come on. Dr. Russel takes notice that such patients as he attended complained greatly of their heart. "A sense of oppression about the præcordia (says he) which the sick were at a loss to describe, was, in one degree or other, a constant attendant on the plague, except in very slight cases of infection; and where it came on early, or persisted in a high degree, was always a dangerous symptom. The sick showed how severely they suffered by their perpetually changing their posture, in hopes of relief; but, when asked where their pain lay, they either answered hastily they could not tell, or, with a fixed, wild look, exclaimed *kulbi! kulbi!* (my heart! my heart!) This anxiety increasing as the disease advanced, terminated at length in mortal inquietude, the patient, for many hours, in the last stages, incessantly writhing his body and limbs as if in agony. Though pain at the heart was often conjoined with the symptom just mentioned, and by the sick seemingly blended together, it appeared to be different, and to exist separately. They often exclaimed as in the other, my heart! my heart! pointing also towards the scrobiculum cordis, but then would add *eujani kulbi*, my heart pains me; or *naar fi kulbi*, my heart is on fire." This last pain the Doctor supposes might have its seat in the upper orifice of the stomach; the extreme anxiety may be accounted for from the enlargement of the heart; but as neither of these symptoms took place in such as died in a very short time, we must be apt to consider this enlargement not as any primary and essential symptom of the disease, but as one which takes place when the vital powers are able to oppose for some considerable time the cause of the disease.

In his account of the origin of the plague, Dr. Russel takes notice of the opinion that, at the communication of the infection, the sick were sometimes sensible of having received it. This has been observed by Dr Lind
in

in malignant fevers ; it has also been observed in plagues, as we have seen from Dr. Hodges, Verdoni, and others ; but Ruffel says he never saw any instance of this. He owns, however, that he has seen instances of the disease quickly succeeding a panic fear of being infected. “ In cases (says he) where the disease was not discovered to be the plague, till upon the eruption of buboes after two or three days, I have known several persons who had, till then, without the least suspicion, frequented the sick, struck suddenly with a panic, and imagine themselves ill. They felt shooting pains in their groins, confusion in the head, and a loathing. Though in some these complaints were merely imaginary, and soon vanished, in others they proved real ; the symptoms increasing, and being followed by eruptions. In such cases I suspected the latent infection to have been excited by terror.”

In the instance formerly quoted from Dr. Guthrie at Petersburg, we have a notable example of this sudden seizure by a stroke. His information was derived from the physician-general of the Russian army. This gentleman assured him, that “ he had seen men, in apparent good health, instantaneously drop down, as if shot by a musket ball, by the sudden action of the pestiferous miasma, and upon duty again in 24 hours, perfectly recovered by the operation of a strong vomit.” Whether or not these men *felt* any stroke at the instant of their falling we are not told : possibly it might be only a syncope very common in the plague, which took place at the very first invasion. Ruffel informs us, that “ the sudden loss of strength, and disturbance of the functions attributed to the brain and heart, are reckoned, in a particular manner, symptoms of the plague. In their highest degree they distinguish the most fatal forms of the disease ; and, under different modifications, adhere to all its varieties. . . . The early appearance of faintness was very remarkable in the plague,” &c.

Thus we see that the plague attacks without fever in two different modes ; one, by attacking and destroying the

the solid parts of the body, the other, without any disorganization of the body, attacking the vital principle itself, or rather the blood, from which this principle is derived, so that a temporary suspension of all the functions ensues. The analogy between the cause of pestilence and those visible substances called *poisons*, is very remarkable in some things, though in others it totally fails. In the Medical Repository * we have a dissertation upon this analogy by Dr. Edward Miller. He observes, that this analogy has been generally overlooked, chiefly on account of the invisible nature of the aerial poison, and the suddenness of death from poisons, more frequently than from pestilential diseases. This he accounts for from the largeness of the dose of poisons compared with that of contagion; "but (says he) by diminishing the quantity to an appropriate amount, these noxious substances (the poisons) may be made to exhibit the course, duration, and nearly all the phenomena, of what is called a malignant fever. But, above all, the attention of physicians has been diverted from this analogy between miasmata and poisons, by the febrile part of the character which generally belongs to pestilential diseases, and which, in common apprehension, is constantly connected with them. Yet these diseases are by no means universally accompanied with what is strictly called *fever*. There is often a degree of virulence in the Asiatic plague, in the yellow fever, and in all the other forms of pestilential and malignant diseases, which altogether transcends the process of fever, and extinguishes life in a more summary manner. In the worst cases both of poison and pestilence, the febrile part of the symptoms excites little attention."

Our author does not say in what this virulence consists. In the cases of those who die with the *tokens* upon them, the cause is plainly within the body; the destroying power acting with greatest efficacy below the skin in the soft substance of the flesh. Where the patient is suddenly seized in the manner described by Dr. Guthrie, the cause seems to be something foreign to the body suddenly

* Vol. ii, p. 409.

suddenly inhaled, the effects being similar to those of fixed air when drawn in by the breath, and of consequence easily expelled by a vigorous action of the powers of the system. Guthrie observes, that, in such cases, it seems "as if the contagious matter existed in a very loose state in the first passages at the beginning of the disease."

In the production of those *tokens* mentioned by Dr. Hodges, we know that there must have existed in the body a certain cause capable of totally destroying the parts, and reducing them to an hard eschar, similar to that produced by fire or by a caustic. As we are unacquainted with any thing capable of producing this effect but fire, we can attribute the origin of these tokens to nothing else but the emission of the latent heat of both the solids and fluids which compose these parts, and their consequent transmutation into an hard, and as it were charred, substance. That such an emission of latent heat does in some cases take place is evident from the production of a great quantity of sensible heat when certain substances are mixed together. Thus, upon mixing together oil of vitriol, oil of turpentine and strong spirit of nitre, the whole mixture will take fire and burn violently, though two of the ingredients, viz. oil of vitriol and spirit of nitre, are by themselves incapable of being inflamed. In like manner if strong spirit of nitre be poured upon oil of cloves or saffrafras, the mixture will burst out into a violent flame. Water poured upon quick lime occasions great heat, and seems in great part to be converted into a solid substance; for only a small part evaporates, and the flaked lime falls into a powder to appearance perfectly dry, and from which the moisture cannot be expelled without a very violent fire. In this case Dr. Black is of opinion that the heat comes from the water, which, as we have already seen, contains a great quantity of it in a latent state. But, according to his experiments, the emission of 135 degrees of heat is sufficient to reduce water to a state of solidity; and the heat of lime when slaking is so much superior to this, that ships have frequently been

set on fire by it. We must therefore either say that water in certain circumstances can part with much more than 135 degrees, or that the lime itself emits part of the heat it contains. This last indeed seems to be the more probable supposition of the two; for though fluids contain more heat in proportion to their bulk than solid bodies, we have no reason to suppose that the latter contain none at all: on the contrary the experiments formerly mentioned, especially those made by Count Rumford, show that they are furnished with an almost unlimited quantity.

The cause of the most violent kind of plague then we must suppose to be something received into the body, which in a certain time, probably sooner or later according to the strength of the contagion, disposes to an irregular emission of its heat, which coming by a kind of explosions, or, as Dr. Hodges calls them, *blasts*, produce those eschars which have been called *tokens*, and seem to be no other than partial combustions, by which the parts affected are reduced to a state of charcoal, or nearly so.

In assigning this cause for the most deadly kind of plague, we must naturally ask the question, how can all this take place without any pain? for of those who died in this manner, many felt neither pain nor uneasiness till within a few moments of death. This can only be accounted for by the sudden and perfect destruction of the parts, which did not allow time for any sensation of pain to take place; and indeed in the application of caustic for an issue, the patient often feels but little pain. It is impossible to avoid perceiving a very strong connexion between this kind of plague and the dreadful cases of spontaneous combustion related p. 182—186. In the case of the priest indeed the fire seems to have come from without, though even this cannot be ascertained beyond a doubt; but in those who were absolutely consumed to ashes, it seems equally probable that it may have arisen from within; and as none of the unfortunate persons seem to have made any noise or struggle, the priest alone excepted, it seems probable that the first attack had deprived them of all sensation, and that, notwithstanding

withstanding the terrible ideas with which such extraordinary occurrences must have inspired those who saw them, the sufferers may have died without feeling any pain. The priest seems to have felt nothing after the first stroke.

Should this cause be admitted (indeed whether it is admitted or not) we see that it is in vain to attempt to solve the phenomena of pestilence by the doctrine of stimuli, excitement or debility. There is no degree of stimulus, fire excepted, which can convert part of the body into an hard eschar, neither can it be done by any degree of debility or exhaustion. Besides, the irregular manner in which these eschars are scattered up and down, shows that the cause has not acted from a regular diffusion all over the body, but in a number of insulated spots, between which the connexion can by no means be traced. In all pestilential eruptions indeed the action of fire seems to be very perceptible. Gotwald mentions his having observed in two patients what he calls *papule ardentes* "burning pimples," which Dr. Russel supposes to be a modification of carbuncular pustules. Gotwald calls them also *fire-bladders*, and says that they were as broad as a shilling, of an irregular shape, and the skin seemed as if *shrivelled with fire*. The carbuncle itself approaches much to the nature of the eschar, and is attended with violent heat in the adjacent parts. Gotwald, who gives an account of the plague at Dantzic, distinguishes the carbuncle into four kinds, (to be afterwards described.) Of these he says in general, that they all *burn* very violently at first, &c.

From all these accounts it seems plain, that in the plague there are partial discharges of heat, from *some* cause, upon various parts of the body; and that, in many instances, this heat destroys the texture of the parts entirely. When this is done instantaneously the patient feels no pain, but if more gradually, the pain is excessive, as in the case of buboes and carbuncles; which the Journalist of the plague year in London informs us were attended with such horrid pain as to make the patients cry out in a lamentable manner. This extraordinary

ary heat must either come from without or within, and we have all the reason in the world to believe that it comes from within. Mr. Hunter, in his Treatise on the Blood, informs us that in a local inflammation there is always an increase of heat in the inflamed part. Should this heat arise, as it probably does, from an emission of part of the latent heat, we may conclude, that such a quantity might be emitted, as entirely to change the texture of the parts. Thus mortifications or destructions of those parts may ensue, of all kinds, from the mild *pus* to the pestilential eschar.

In the effects of pestilential contagion we observe, if not a *superiority*, at least a *different mode of action* from what takes place in poisons. All these seem to act by dissolving the blood, or infecting it in such a manner that it supplies no sufficient quantity of animal spirits; of consequence, the creature soon faints and dies. In the plague, the blood does not appear to be much affected, nevertheless it emits, in various places, certain explosions which convert the parts into an eschar. Poisons always seem to produce the petechiæ or purple spots which sometimes appear in the plague. In Dr. Miller's Treatise, already quoted, we find, among the symptoms occasioned by arsenic, "red or dark spots appearing on the skin, and rapid putrefaction, which renders speedy interment necessary." Herein it differs from the plague, for the bodies of such as die of that distemper are not more liable to speedy putrefaction than others. Of the vegetable poisons he also observes, that, "after death, sometimes before, livid spots are observed on the body, the appearance of the blood is dark and dissolved, and putrefaction speedily takes place." Of animal poisons—"The bite of the poisonous serpents is generally followed by tumour, and livid colour of the part bitten, extravasation of dark coloured blood into the adjacent cellular membrane, nausea and vomiting, sudden prostration of strength, paralysis of the limbs, convulsions, yellowness of the skin, hæmorrhages, &c. Livid appearances of the body, a dark coloured and dissolved state of the blood, and a rapid putrefaction, are observed after death,"

From

From all these accounts, however, it is plain, that, whatever may be the analogy between the action of poisons and malignant fevers, they do not in any manner operate like the contagion of the true pestilence. Of this the constant effect is to produce buboes, carbuncles, and other eruptions, resembling much more the effects of fire than any thing else; or, if the patient is cut off without the appearance of these, similar effects are observed on the internal and vital parts. Dr. Miller's conclusion seems therefore liable to exception; in which he says, "that only the lighter cases of pestilence are unlike the effects of poison, but that, in proportion to the degree of malignity, the resemblance grows stronger." It doth not appear that any poison hath produced one of the characteristic symptoms of the true plague, or any thing but what is common to animals dying of various diseases, the red spots on the skin only excepted.

In the eighth volume of the Philosophical Transactions abridged by Martyn, we have an account of a number of experiments by M. Deidier and others, made upon dogs into whose veins he injected, or poured into wounds made in the miserable animals, the bile of people dead of the plague at Marseilles. "The consequence was, that they became melancholy, drowsy, and without caring to eat. All of them died in three or four days, with the essential marks of the true plague, declared by buboes, carbuncles, and gangrenous inflammations in the viscera, in the same manner as in the human carcases from whence the bile was taken."

The poisonous bile affected the creatures differently according to the vicinity of the place of injection to the heart. In the jugular vein it killed them in twenty-four hours, injected in the quantity of a drachm to two ounces of water. In this short time were brought on gangrenous inflammations, the heart was stuffed with *thick and black* blood, the liver was swelled, and the gall-bladder full of green bile. This shows a very essential difference between the action of the pestilential poison and that of others; the former, in some parts of the body at least, coagulates the blood; the latter, in all parts, dissolves it. in

In the crural vein (the vein of the leg) the effects were less violent. In about an hour they became heavy. In the former case they instantly became drowsy. In the second experiment they contracted such a loathing for food, that they would neither eat nor drink any thing after the injection was made. On the third day there appeared considerable tumours under the *axilla* (the fore leg I suppose) and on their thighs, about three inches from the wound. The wound itself turned to a gangrene, and the creatures died usually on the fourth day.

In another experiment the animal had convulsive motions all over immediately after the injection, followed by a lethargy. Next day a carbuncle appeared on the great pectoral muscle on the right side. On the third, a bubo appeared on the thigh, and the same day the dog died. From the time of the injection he had neither eat nor drank. On dissection the fore part of the breast under the teguments was found entirely gangrened, the inward parts and viscera full of black clotted blood, the outward surface of the lungs was all purple, the heart was swelled as big again as usual, and the four cavities were full of black clotted blood. The bile of this dog, injected into the crural vein of another, produced similar symptoms, only the latter eat a little boiled meat, which he vomited up again in two hours. He died the third day, with the same symptoms of the plague as the others.

The bile of people who died of ordinary malignant fevers was much less powerful. A quantity (not mentioned how much, but probably a drachm) mixed with four ounces of warm water, was partly injected into the jugular vein of a dog, and a compress soaked in the rest of the liquor applied to the wound. He appeared heavy and sleepy, and would neither eat nor drink till the third day, when he did both willingly. On the fourth day the compress fell off, the wound was found to be diminished one half, and healed by degrees, the dog recovering perfectly. In another experiment with the bile of a patient who had died of a malignant fever, the dog not only

only had about a drachm of it put into a wound in his thigh, but was made to swallow some of it; notwithstanding which he was not seized with any distemper, and the wound healed in fifteen days. This bile was as black as ink, in great quantity, and very thick. In the other subjects it was of a deep green. In another experiment, with the same bile applied on a compress, the dog likewise escaped without any apparent disorder; but in a third, the animal died in twenty-three hours, though at first he had shown no sign of being affected, only that he seemed to be thirsty, and drank with greediness. On opening him his heart was found still to beat with violence, and, after the beating ceased, no blood was to be found in it, either in the auricles or ventricles. "This liquor, crowded together in the great vessels, appeared of a lively red, and very fluid, without any of those concretions that we constantly observed in those who died of the plague. Here appeared neither external nor internal marks of the plague." The bile of a person who had died of an erysipelas, injected into the crural vein of a dog, produced no bad effect. A dog was killed by half a drachm of Hungarian or blue vitriol injected into the jugular vein. He died in universal convulsions: the heart was full of grumous blood, reduced to a kind of thick pap, but without any clots. The bile, applied to two wounds in another dog, produced no bad effect.

From other experiments it appeared that even the pestilential poison itself, taken into the stomach of dogs, did not produce any deleterious effects. "A dog of the Hospital of the *Mail* in Marseilles, who followed the surgeons when they went to dress the sick, used greedily to swallow the corrupted glands, and the dressings charged with pus which they used to take off the plague sores: he licked up the blood that he found spilt on the ground in the infirmary; and this he did for three months, being always gay, brisk, well, full of play, and familiar with all comers." The health and briskness of this unfortunate dog proved his ruin, by making him the subject of philosophical experiment.

A drachm

A drachm of the pestiferous bile injected into the crural vein, killed him in four days. He had a considerable hæmorrhage from the wound the night before he died, and he had also a disagreeable smell both while living and after he was dead. Two other dogs, which had swallowed a quantity of pestiferous bile, became heavy and melancholy, refused their food, and showed other signs of disorder; but all these went off in a short time, and no signs of the distemper appeared.

These experiments induced M. Deidier to suppose that the contagion of the plague lay only in the bile; but the following experiment shows that the blood was equally infected, and capable of communicating the disease, and that of the most malignant species. It was made by M. Couzier, physician to the infirmary at Alais, and in the Philosophical Transactions we have the following account: "I took a quantity of blood from a person dead of the plague, and mixed it with warm water, which mixture I attempted to inject into the crural vein of a dog, but the end of the syringe being too large to enter the vein, the experiment did not succeed. This made me resolve to try to lay some of the same infected blood upon the wound. This I accordingly did, and covered it with a dressing, which the dog got off in the night. I found the next morning that the dog had licked the wound, and that he refused his food. Towards night he began to bemoan himself, and gave signs of an approaching death. The next morning I found him dead, the wound being considerably swelled and gangrened, and the edges round the swelling were likewise gangrened.

"Upon opening the body, we found the liver something larger than usual, with spots of a livid purple, as in the bodies of persons dead of the plague. In the stomach was found a quantity of black coagulated blood, of the size of a hen's egg. This in all likelihood was what he had swallowed upon licking the wound. The heart was very large, with a black grumous blood in the ventricles, and the auricles were turned blackish and gangrenous."

This

This last experiment naturally brings to remembrance those of Dr. Home at Edinburgh, in which he inoculated the measles by means of the blood of patients ill of that disorder. From the accounts he has given in his treatise entitled *Medical Facts and Observations*, we can have little doubt that *his* experiments succeeded, however others may have failed. One thing, however, is very obvious, viz. that if we mean to communicate a disease by means of the blood, we must use a much greater quantity than if we make the experiment with the matter of an abscess. The case of contagious diseases seems to be the same as in fermenting liquors. With a small quantity of yeast we can easily induce fermentation in any proper liquor, but, if we skim off the yeast, and use only the pure fermenting liquor, we must use a much greater quantity; and to inattention to this circumstance we may with probability ascribe the difficulty which Dr. Home himself met with in introducing the disease, and the total want of success in others. In M. Couzier's experiment a considerable quantity must have been used, as he says that in the dog's stomach it equalled the size of an hen's egg. A much smaller quantity of matter taken from a pestilential abscess is capable of producing the disease in a human body, as is evident from the case formerly quoted of that gentleman who inoculated himself for the plague, and of which Dr. Guthrie gives the following account: "This was Mathias Degio, one of the
 "surgeons of the hospital at Bucharest, a building appropriated to the cure of the plague in the Russian army.
 "He, perceiving the gentlemen of his profession *condemned*
 "in a manner to death, if *punctual in the discharge of their duty*
 "had the resolution to inoculate himself for the plague, in
 "the full confidence of its efficacy, and ever afterwards
 "found himself invulnerable, whilst his companions
 "around him were falling victims to its fury. He produced the disease by inserting, with the point of a
 "lancet, under the epidermis of his arm, matter from a
 "pestiferous abscess, and followed the cold regimen ob-
 "served

* This, among innumerable other instances that might be brought, is a proof of the infectious nature of the plague.

“served in the small-pox, as he had imitated its mode
 “of inoculation. On the fourth day of the puncture
 “the fever declared itself, and he, being perfectly devoid
 “of fear, got through the disease without feeling more
 “inconvenience than if it had been that which he imi-
 “tated. He drank freely of cold water, with vinegar,
 “or a little wine, and kept generally out of doors. This
 “beverage was the only thing that had the appearance
 “of medicine,” &c.

From a careful attention to all these histories, it is plain that the plague is naturally an eruptive disease, as, in all the animals in which it was artificially brought on, eruptions took place, provided the life of the creature was sufficiently prolonged to allow them to come out. Dr. Ruffel says, that, from his diary, he noted down the cases of *two thousand seven hundred* patients, all of whom had eruptions of one kind or other. In this it agrees with the small-pox, which Dr. Mead justly considers as an inferior kind of plague. In the latter, however, the eruptions seem to resemble those called by Dr. Hodges the *tokens*, only that the cause which produces them is less violent in its nature; but why the eruptions of the small-pox should be in distinct pustules, and not one continued boil all over the body, is undoubtedly inexplicable on any theory whatever. The same is true of the plague. No man can explain why the tokens, for instance, instead of being collected into one great eschar, are dispersed into small distinct pieces; or why, instead of buboes in the groin and armpit, or instead of carbuncles in different parts of the body, there should not be a single one equivalent in bulk and power to them all. This appears similar to the phenomena of rain, hail or snow, which fall in distinct drops, fluid or congealed, or in flakes, instead of being equally diffused all over the spot on which they fall. In the latter case we say that the phenomenon is occasioned by *electricity*: we may say the same, if we please, of the small-pox and plague, with equal emolument.

From the accounts we have just now quoted, it appears that there is between malignant fevers and the

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true

true pestilence a very essential difference; the latter tending to thicken the blood, the former to make it thinner. In this respect therefore the poisons seem to resemble malignant fevers very considerably; for M. Fontana observed that by mixing animal poisons with blood drawn from a vein, it was prevented from coagulating. In the instance above related where a dog died in consequence of bile injected into his veins from one who died of a malignant fever, the blood was found extremely fluid. In some who died of the hospital fever, Sir John Pringle informs us, that suppurations had taken place in the brain; but in the true plague the tendency to mortification always prevailed above every thing.

Lastly, that the plague proceeds from too great a quantity of heat, either emitted from the body itself, or some how introduced into it, seems to be pretty plain from the effect it has of augmenting the venereal appetite to an almost inconceivable degree. This was taken notice of in the plague of Marseilles, and indeed in many others. Ruffel quotes two remarkable passages to this purpose; one in a plague at Genoa, the other in Messina. "Amidst so many dreadful fears and terrors, amid so many
 "fetid and putrefying bodies, amid the shrieks, the sighs
 "and the groans of the sick, what would you have
 "expected? That the people, struck with dread and
 "horror, remained sad, modest and quiet. You are
 "mistaken. They sung, played on instruments, danced,
 "intrigued, and Genoa never was seen so shameless,
 "debauched, and disorderly. I have said before, that
 "God in this plague gathered in a harvest for heaven;
 "but it seemed to be also a vintage for the lascivious of
 "of the earth. If not so, how came so many marriages
 "to be celebrated in the Lazaretto of Consolation, and
 "that so many women, without shedding a tear for the
 "death of their husbands, immediately entered into new
 "engagements? One day, in particular, five marriages
 "were performed, four of the bridegrooms being buriers
 "of the dead, and dressing themselves and their brides
 "in clothes stripped off from the bodies of the deceased."
 On the plague of Messina he quotes the following extract
 of

of a letter written by a gentleman who resided in that city during the plague in 1743. "It has always been observed, that, after *every* plague, those who recover are addicted in an extraordinary degree to lewdness and incontinence, which was surprisingly visible at Messina, and carried to such a degree of frenzy and bestiality, that many were known to violate the bodies of dead virgins !"

That an extraordinary propensity to venery may be produced by introducing into the body a quantity of heat, admits now of a kind of demonstration from a fact mentioned by M. le Roy concerning phosphorus.* This substance is exceedingly apt to take fire on the application of a small degree of heat, and even by slight friction. It is now introduced into the materia medica, and is found to be a very powerful medicine, though dangerous on account of its inflammability, the heat and air contained in the human stomach being sometimes sufficient to set it on fire. The taking such a substance into the body therefore seems not much different from taking actual fire into it ; and indeed M. le Roy mentions the case of a woman who had taken only a single grain, and who he says had been recovered, *by it*, from a putrid fever, but died suddenly from some imprudence. In this woman the whole substance of the body was found luminous upon dissection, and the hands of the operator continued luminous even after being washed. M. le Roy, having taken three grains of this fiery substance, found himself extremely incommoded by it for some hours, and was obliged to drink great quantities of very cold water. Next day he found his muscular powers amazingly increased, and had an *almost insupportable venereal irritation*. This we see was the consequence of throwing into the body a quantity of heat from without ; but if the body itself emits that heat which it invisibly contains, the effects must be the same as though an extraneous quantity had been thrown into it. Neither are we to imagine that the *quantity* of heat contained in our bodies is small or inconsiderable ; for we have already
seen

* Memoires de Societe Medicale, &c.

seen that heat consists in the efflux from any substance, of an invisible and most subtile fluid, in all directions. When this flux is gentle, the heat is moderate, but in proportion to the activity of the discharge, the temperature becomes hotter and hotter, and if very violent, the cohesion of the parts is dissolved entirely, and the substance is said to be on fire. There is required therefore only some cause to begin the emission of this fluid; for as soon as this begins, the immense quantity with which we are surrounded, will supply more in abundance,* and continue so to do, as long as the original cause subsists, or until the substance can no longer bear the power which operates upon it.

From this view of the causes of the plague, and from the facts which have been laid down concerning it, we cannot help perceiving a very strong similarity between the plagues mentioned in the Old Testament and those which still exist in the world. In one of the passages formerly quoted it is called an *inflammation*, an *extreme burning*; and from the testimonies of different authors above quoted, it is plain that the disease still deserves the name bestowed upon it in the sacred writings. From the account given of its proximate cause, it is plain that plagues of all degrees of intensity may take place, from absolute accension of the body, and its reduction to ashes, to the mildest state of the disease, in which the patient is not confined to his bed; and all this from the single principle of emission of heat from the body itself. It likewise appears that there may be either in the body itself, or in the element which surrounds it, such a constitution as will dispose that element which is the natural and immediate preserver of our life, suddenly to attack and destroy it, of which the case of the Italian priest is a most remarkable instance. In other cases, such as
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* If we consider the composition of the atmosphere which surrounds us, we must acknowledge that by far the greater part of it consists of fire and electric fluid, the latter being properly the element in a comparatively quiescent state. In deflagrating dephlogisticated and inflammable air, the mixture has sometimes shrunk up into a three hundredth part of its bulk; which shows that of these airs two hundred and ninety-nine parts are fire, the single remaining part only being earth, water, or some solid matter which we call the *basis* of air.

the Italian lady, and the woman at Coventry, the body itself seems to have given out its heat, though this could not be done without a concurrence of the surrounding ethereal fluid. In a stage still lower, the body is partially consumed, or rather partly charred into a kind of cinder, as where the *tokens* are produced; and when the cause acts with still less violence, a fever is produced. In the Old Testament we find these different kinds of plagues very distinctly mentioned. In some cases the offenders died by actual fire, which either struck them from without, or was kindled within their bodies. In others, they seem to have died by that very deadly kind of plague of which we have already said so much, which kills in a few hours. This was probably the plague which destroyed the army of Sennacherib, and this in the tenth chapter of Isaiah is by some thought to have been prophesied of under the title of a *burning like the burning of a fire*.

Of these things I the rather take notice, as I perceive, in a late oration, not only the doctrine of the plague being propagated by contagion severely ridiculed, but the scripture itself treated in a most indecent and scandalous manner. "In the earliest ages of the world (says he) when ignorance and superstition led men to attribute all extraordinary phenomena to the direct agency of supernatural beings, pestilence was supposed to be immediately imported from heaven. This is the opinion which appears to have prevailed among the ancient Hebrews, and may be ranked at the head of the catalogue of absurdities on this subject. The dominion of prejudice over the minds of that ignorant and obstinate people appears in this instance particularly striking. Such was the depth of their blind bigotry in favour of the healthfulness of the globe they inhabited, that they would seem to have considered it as even superior to that of the celestial regions. Hence, unwilling to believe that their favourite earth could give origin to an evil so dreadful as the pestilence, they imported the seeds of this calamity from the more unhealthy climate of heaven! !"

In

In this extraordinary paragraph we find the matter so much misrepresented, that every vestige of truth is swallowed up in it. The Hebrews believed that they were under the immediate inspection and government of the Deity ; a doctrine which, however our author may *disbelieve*, he cannot *disprove*. But, notwithstanding this immediate inspection and government, the Deity never did bring upon them any plague but by the intervention of natural causes. The agents which he had originally created were sufficiently able to execute his purposes. The Creator never employed any power but what already existed in the world, and the power that he generally did employ was *fire*. This agent he directed to exert its force in such degrees as he pleased, and against whom he pleased. It is a mistake to think that miracles were *immediately* the effects of supernatural power. They were all accomplished by the very powers which exist in the world at this moment, only these powers were by the Creator at particular times directed to act in a manner that they would not have done had they been left to the mechanism of their own nature. When we read therefore of people being consumed by fire from the Lord, there was neither importation of fire from heaven nor any where else ; the element exerted its power on these particular persons, either by lightning proceeding from the cloud which represented the Deity, or their bodies threw out the latent heat which they contained, and consumed of themselves. That in cases of this kind there was no *importation* supposed, is evident from an expression used about bringing water from the rock. It is not said that the water fell from the stars, or came down with the tail of a comet, but that the rock gave out the water which it previously contained. At the present day the same powers exist, and sometimes produce the same effects that they did in former times, with this difference, that now, having no intelligent agent to interfere with their natural mode of action, they exert their force indiscriminately, and as the mechanism of their nature happens to be stimulated, they destroy every thing promiscuously before them. In all this I cannot perceive the

the smallest absurdity, or any thing but what a reasonable man *may* indeed *must* believe, if he makes use of his reason. As to the causes which Dr. Caldwell so much insists upon, viz. filth and corruption, it is extremely probable that (while the Israelites were in the wilderness) these had no existence. By their law they were enjoined such frequent ablutions, that their bodies must always have been perfectly clean. Human excrements were not allowed to lie above ground. The offals and dung of their sacrifices were carried to a distance, and they were expressly told, that they must not allow of any uncleanness in their camp, lest God should turn away from them and abhor them. Add to all this the great heat and dryness of the desert in which they wandered, which would quickly parch up and carry off the moisture from any dead carcases or putrefying matters that might be allowed to remain notwithstanding the injunctions to the contrary. Indeed if we consider the dryness of the climate where these people were, and that they were constantly attended by a large stream of water, it is difficult to conceive any situation upon earth more healthy than that of the Jews in the wilderness. If plagues therefore came upon them, it is difficult to say how they could have happened according to the ordinary course of nature; and, if not according to this, it must have been by an alteration of it, or by miracle.

The plague, as has already mentioned, in its very severe state appears most commonly in the beginning of an epidemic season, and is neither very common nor very infectious. The most common mode in which it invades the patient is with the symptoms of a malignant fever; and of cases of this kind Dr. Ruffel has made up his five classes of patients, the first or deadly kind having been already described. In his second class, the next in malignity to the fatal kind, the disease made its attack with a slight shivering, succeeded by fever with giddiness, vomiting, head-ach, and sometimes looseness. In the night the fever increased, the thirst was excessive, and the patient, harassed by the vomiting, &c. passed a very unquiet night, frequently with delirium or coma.

Towards

Towards morning the fever abated, the sick recovered their senses if delirium had taken place, but if coma, it continued through the day, and the remissions were less. Throughout the first day, and part of the second, the pulse was full and strong, but on the second it began to alter, and some of the characteristic signs of the disease to appear. The principal of these was a certain muddiness in the eyes, which sometimes took place even on the first day. This is by our author accounted a symptom very difficult to be described, and, though he recounts the descriptions given by several authors, none are found adequate to the real appearance. "It resembled (says he) somewhat the dull, fixed eye observable in the last stage of malignant fevers; but the dullness was different, muddiness and lustre being strangely blended together. It continued with little alteration in the remissions, and even where the patient appeared sensible and composed it did not increase in the febrile exacerbations, but the eyes acquired a redness that added wildness to the look, which abating or going off in the remissions, the muddiness remained behind. It was this which contributed chiefly in composing that confusion of countenance which I shall not attempt to describe, but which enabled me to pronounce with tolerable certainty whether the disease was or was not the plague, though not independently of other symptoms. When this muddiness disappeared or abated, it was constantly a favourable sign. After a critical sign it often disappeared suddenly, but where there was a succession of sweats, or where no visible crisis happened, its disappearance was slow and gradual."

Along with this muddiness the patient had a peculiar confusion of countenance; the pulse quick and equal, or low and fluttering, but rarely intermittent; the external heat moderately feverish, at other times intense, with irregular flushings, with pain at the heart, or oppressions about the præcordia; burning pain at the pit of the stomach, and incessant inquietude. When to these symptoms were added a faltering in the tongue, loss of speech, while the surface of the body became cold

cold and damp with clammy sweat, death was inevitable. In the evening of the second day all the symptoms became worse, and in the morning the patient appeared to lie quiet more from his strength being exhausted than from any change to the better. When the vomiting had ceased, however, there was frequently such a remission on the third day as gave the attendants great hopes of a favourable event; but these hopes were always fallacious and of short duration. Sometimes where vomiting, looseness or hæmorrhage had preceded, the patient died on the third day: at any rate, none of this class recovered, whether the disease was left to itself, or treated with medicine. The appearance of buboes was of no consequence, for they never came to maturity, and the little advances they made neither accelerated nor retarded the termination of the disease, which happened sometimes on the third, but more frequently on the fifth or sixth day.

The third class of patients were equally unfortunate with the other two. "The difference between the second and third consisted in the absence of vomiting at the beginning, the later accession of coma and other bad symptoms, and a slight tendency to perspiration, which very rarely occurred in the second. . . . From the second or third night the course of symptoms in both classes varied very little, and the termination of the disease was in both the same: it may be added they reigned together through all the periods of the pestilential season, but were most prevalent in its augment; for at its height, and in its decline, they gave place to varieties of the disease less destructive."

The fourth class was the most numerous of all. Its distinctive marks were, "the continuance of the inflammatory or febrile symptoms with less interruption than in the other, a pulse more constantly sustained, or soon recovering itself when hurried in the exacerbations; the length and vigour of the exacerbations decreasing in the advance of the disease; and, above all, the prevalent tendency to a favourable discharge by the skin, with the critical sweats on the 3d, 5th, or sub-

“sequent days. . . . Vomiting was a concomitant in
 “about one fourth of the sick. The fever, for the
 “most part, was very moderate the first night, very
 “rarely accompanied with delirium, and almost never
 “with the comatous disposition. . . . The buboes and
 “carbuncles commonly made their appearance the first
 “day ; but it was not unusual to see a successive erup-
 “tion of these in the course of the disease. . . . The
 “morning sweat, on the third day, in some cases proved
 “completely critical, but more commonly produced
 “only a remission so favourable as to encourage the ex-
 “pectation of a more favourable crisis on the fifth ; but,
 “where the patient neither sweat on the third, nor a
 “sensible remission took place on that day, some degree
 “of danger was always to be apprehended. . . . After
 “the sweat on the fifth, the subsequent exacerbations
 “proved slighter and slighter, and the buboes for the
 “most part advancing favourably, little or no fever was
 “left remaining after the beginning of the second week,
 “except perhaps symptomatic heats occasioned by the
 “eruptions.” In this class the patients sometimes ap-
 peared only to have a slight attack, and yet at last
 were seized with mortal symptoms, while others who
 seemed to be much worse at first yet happily recovered
 and did well. In general the severe pestilential symptoms
 did not come on till a considerable time after the attack.

To the fifth class our author refers all cases of slight
 infection, wherein the more formidable symptoms of
 pestilence never concurred, and *all* the infected recovered.
 “The access here was often attended with so little ap-
 “parent disorder, that the eruptions gave the first alarm ;
 “and the fever which came on afterwards was frequently
 “so slight as not to confine the sick to the house. Others
 “found themselves indisposed for two or three days,
 “but were not sensible of any febrile heat whatever.
 “But in this class the disease did not always invade
 “thus insensibly. The febrile symptoms, especially the
 “first three days, sometimes run pretty high ; and the
 “fever afterward, in nocturnal exacerbations particularly,
 “run out to the end of the week or longer : but, as
 “there

“there was no concurrence of alarming symptoms, and
 “the exacerbations, terminating for the most part in
 “sweats, gradually diminished in force after the third or
 “fourth night, it was not difficult in the worst cases to
 “foretel the event at that period, nor necessary in others
 “to defer the decision so long.”

“All the infected had buboes or carbuncles, and very
 “often both eruptions concurred in the same subject.
 “Persons not confined by indisposition were often, by
 “the inguinal buboes, prevented from walking abroad.
 “The carbuncles constantly formed the *black crust*,* and
 “then suppurated; the buboes in one third of the sick
 “dispersed. The dispersion of the buboes was never
 “observed to be attended with bad consequences, not-
 “withstanding the general neglect of purging in the
 “decline of the disease: indeed very few had recourse
 “to remedies, topical applications excepted, unless per-
 “haps a bleeding at the beginning, where the febrile
 “symptoms ran high. This class was *nearly as numerous*
 “as the fourth, but began to predominate rather later,
 “and reigned most of all in the decline of the plague
 “in 1762.”

The sixth class must be omitted, as containing dubi-
 ous, anomalous and extraordinary cases. We shall
 therefore proceed to consider the accounts of the plague
 given by other physicians, which, without questioning
 the accuracy of Dr. Patrick Russel in relating what *he*
 has seen, may serve to throw some light on the subject,
 by relating what *others* have seen. Dr. Alexander Rus-
 sel, in his Natural History of Aleppo, gives the follow-
 ing description of it. “The distemper in itself is the
 “most lamentable to which mankind are liable. The
 “torments of heat, thirst and pain frequently unite in
 “some patients; an unspeakable dejection and languor
 “in others; and even those who escape with life do
 “not cease to suffer from painful and putrid ulcers, the
 “painful remains of the disease. The desertion of rela-
 “tions, of friends, and of domestic servants, the want
 “often

* This is in favour of what has already been observed, that the pestilential
 eruptions in *all* cases showed a tendency to mortification.

“ often of the common necessaries of life, and the difficulty of procuring medical assistance, are circumstances likewise which aggravate the miseries of the sick, and contribute greatly to augment the general horror.

“ But, as no disease incident to mankind is in its nature more terrible and destructive, so none is more difficult to observe. Its symptoms are scarcely in all respects alike in any two persons, and even vary extremely in the course of an hour in the same subject. The disease, attended in the beginning with symptoms not highly alarming, often ends fatally in a few hours; while the most formidable attacks, by a sudden and unexpected alteration, sometimes terminate happily.

“ The first complaints of those seized with this distemper, were, in general, a coldness or shivering; sickness; a vomiting of large quantities of porraceous bile, which often had a very offensive smell; anxiety, or an inexpressible uneasiness about the pit of the stomach; pain in the back or loins; an intense head-ach; uncommon giddiness, and a sudden loss of strength. Some were sensible of a sharp shooting pain darting at intervals into the parotid, axillary or inguinal glands. To these symptoms succeeded a violent fever; in which, while the sick complained of extreme inward heat, their skin, externally to the touch felt little hotter than usual. Sometimes this heat became general and intense; at other times particular parts only were affected; but it seldom continued long in the same degree, having several unequal remissions and exacerbations in a day. In these exacerbations the face became florid, but would often from a deep scarlet change to a livid colour, like that of a person almost strangled, and, again suddenly changing, it would assume a cadaverous paleness. The eyes, soon losing their natural lustre, acquired a kind of muddiness; and the countenance of most of the sick was ghastly and confused beyond description. The pulse at the beginning was somewhat quicker and lower, but in other respects varied little from the natural state. Within a few hours it commonly increased in quickness and strength, but
“ seldom

“ seldom remained the same for an hour, nay scarcely
“ many minutes together ; incessantly varying, both as
“ to strength and quickness, and without any manifest
“ correspondence with the other febrile symptoms.

“ In such as complained of pains darting either into
“ the parotids, the arm-pits, or the groins, a small hard,
“ deep-seated tumour, with external discoloration of
“ the skin, was discovered by the touch in the part, and
“ these were the incipient pestilential buboes.

“ The appearances now described were those of the
“ distemper on the first day, till evening, when the sick
“ always suffered a severe exacerbation, in which the
“ heat both internal and external became excessive ;
“ and, as they generally were by that time delirious, it
“ was often with difficulty that they would be kept
“ within doors ; they were greatly disposed to talk, but
“ faltered so in their speech, that what they said was
“ hardly intelligible, the tongue having shared with the
“ other organs in the general debility. The exacerba-
“ tion lasted the most part of the night ; but the heat,
“ delirium, and inquietude abated towards morning, and
“ a manifest remission took place. Some recovered their
“ senses entirely, some partially, and then complained of
“ intense head-ach, or of pains from the buboes ; it was
“ usual in this interval also that those who had carbun-
“ cles began to complain of *burning* pain in those *fiery*
“ eruptions. The morning remission was commonly of
“ very short duration ; the rigours, anxiety and delirium
“ soon returning more violent than before, attended with
“ a strong and frequent subsultus tendinum. These fe-
“ brile symptoms did not increase regularly as the day
“ advanced ; but went away and returned at intervals
“ leaving short but alarming intermissions ; for each
“ exacerbation surpassed that which preceded it either
“ in violence or duration. In the evening the pulse
“ could hardly be counted, by reason of its depression
“ and quickness ; the patient became comatose, and the
“ respiration was quick, laborious, and interrupted.
“ The buboes which, some hours before, seemed mani-
“ festly to advance, often subsided, and sometimes al-
“ most

“ most entirely disappeared ; the carbuncles, mortifying
“ at the top, resembled a *great eschar made by a caus-*
“ *tic* : and at this period also livid or black spots, of
“ various dimensions, often were found scattered univer-
“ sally on the body.

“ Under these circumstances, dreadful as they seem-
“ ed, some hope of recovery still remained ; for, though
“ many of the sick died on the third day, several had a
“ favourable crisis on that day, by a profuse sweat ; some
“ struggled to the fifth day, a few to the seventh, and,
“ here and there one, even to the eleventh ; before
“ any critical alteration took place. Where a copious
“ sweat happened on the third day, if it did not prove
“ perfectly critical, it at least always considerably abated
“ the fever ; which, in that case, was generally to-
“ tally removed by a second, though less profuse sweat,
“ on the fifth : and then besides weakness the chief re-
“ mains of the disease consisted in the pain of the erup-
“ tions.

“ Nothing could be predicted with respect to the
“ event of the disease from the manner of its invasion ;
“ those who had the most favourable escape having been
“ often in the beginning attacked with as alarming
“ symptoms as others were who died in a few hours.
“ Sometimes the febrile paroxysm, which had set in
“ with such formidable violence, dissolved in a few
“ hours, and left the patient languid indeed, and weak
“ in an extreme degree, but free from other complaints
“ except the pain arising from the bubo, which from
“ that period increasing in size, and advancing favoura-
“ bly to maturation, was, in many cases, ready to open
“ in twelve or fifteen days : the patient all the while,
“ except the first day, walking about as usual. Great
“ numbers happily escaped, not only in the manner just
“ described, but likewise where the buboes never ad-
“ vanced ; for these tumours, so far from coming always
“ to maturation in such as recovered, very often dis-
“ cussed without any bad consequence. Carbuncles
“ often began to digest before the termination of the fe-
“ ver in a critical sweat.

“ All

“ All the infected had buboes, except such as expired suddenly, or survived the first attack a few hours only. Instances of this dreadful kind were more particularly observed in March 1743. The sick were seized in the usual manner ; but the head-ach, vomiting, and pain about the præcordia, increasing every moment, proved suddenly mortal, or terminated within a few hours in fatal convulsions.” Dr. Patrick Ruffel observes, that such instances of sudden death were very rare in the plague of 1760, 1761 and 1762 ; and in these they happened only in the winter, or early in the spring. In such sudden deaths few had any appearance of buboes ; but in general the armpits and groins, or the inside of the arms and thighs, became livid or black, and the rest of the body was covered with confluent petechiæ, livid pustules being here and there interspersed : but all these appearances were more especially observed after death.

In the plague of 1760, vibices as well as livid and black spots were frequently found on the corpse, but not constantly. They were always suspicious in conjunction with other circumstances, but their absence was no proof, though frequently urged as such, that the distemper was not the plague. The vibices sometimes appeared several hours before death, but the livid spots seldom or never.

The tongue in some was quite moist, and continued to be like that of a healthy person throughout the disease ; in others, white at first, then yellow ; at last black, and covered with a dry, foul scurf or fur. The thirst was generally very great, but never constant ; returning at regular intervals, and never appearing to correspond with the danger of the fever. Sometimes it was so little that the patient could not be prevailed upon to drink a sufficient quantity. The appearance of the urine was equally variable, and afforded no certain prognostic ; being seldom alike in any two patients in the same stage of the distemper, and varying in the same patient every day. The vomiting commonly ceased after a few hours, excepting where the sick were induced by thirst to load their stomach, in which case it
always

always returned. Sometimes the patients were costive, in others a diarrhœa took place, but in most the discharges were natural. No critical solution by urine or stool seemed ever to take place. A few cases of hæmorrhages from the nose and uterus were observed; and if they happened after the second day, were soon followed by a plentiful sweat, which commonly proved critical; “a circumstance different from what has been usually observed in the plague at other places.

“From the preceding account of the plague it will readily be conceived that nothing can be more difficult than to form any judgment or prognostic of the event of the disease; in which, as it is justly remarked by Morellus, our senses and our reason deceive us, the aphorisms of Hippocrates are erroneous, and even Hippocrates (as I am inclined to think) might have erred in his judgment.”

Innumerable other histories of the distemper might be given, but the following, it is hoped, will be sufficient, along with what has been already detailed, to show that the plague in former ages was the same as at this day. In the terrible plague which broke out in the time of Justinian, the distemper sometimes began with delirium, and the patient instantly despaired of life; but more generally people were surprised by the sudden coming on of a slight fever; so slight that no danger was apprehended either from the state of the pulse or colour of the body. This, however, was quickly followed, sometimes even on the same day, sometimes on the second or third, by buboes or parotids (swellings behind the ear) which when opened were found to contain a black coal, or *eschar*, of the size of a lentil. If these swellings suppurated kindly, the patient recovered, but if not, a mortification ensued, and death was the consequence, commonly on the fifth day. Black pustules or carbuncles, covering the body, were signs of immediate death, as was likewise a vomiting of blood in weak constitutions; for this terminated in a mortification of the bowels. Pregnant women generally perished, but women were less susceptible of the infection than men; and

and young persons were in more danger than old. Many, who recovered, lost the use of their speech, and such were not secure from a relapse.

In the last plague at Moscow, the symptoms were various, according to the persons, constitution and the weather; in general, head-ach, giddiness, shivering, loss of strength, slight fever, sickness and vomiting, redness of the eyes, white and foul tongue, with a dejected countenance, buboes and carbuncles appearing on the second or third day, but seldom on the fourth. The buboes were seated chiefly in the glandular parts, the armpits and groin, but sometimes made their appearance in the neck, cheeks, &c. Sometimes these suppurated perfectly, and then they proved beneficial, but not otherwise. Sometimes they suddenly disappeared, after having attained the size of walnuts; and this retrocession was always supposed to be a sign of approaching death. Sometimes they neither showed any sign of inflammation nor were painful, and in such cases afforded no relief. Similar swellings sometimes occurred in the parotid glands, but they were never equally beneficial with the buboes. *Carbuncles* were gangrenous spots on the skin, resembling a burn, with black, livid or red vesicles, bordered with an inflammatory ring, and soon terminating in a hard, black eschar. The *anthrax* is more prominent, penetrating deeper into the adipose membrane, and attended with more pain and inflammation. The disease was likewise attended with petechiæ similar to those in putrid fevers, but larger; also with vibices, which resembled the mark of a whip, and were considered, as well as the petechiæ, as mortal signs. No distinct account of the pulse could be given; as, after the disease became general, physicians did not choose to feel the pulses of their patients but through a glove or tobacco-leaf. Worms called *teretes* were frequently discharged both upwards and downwards. Women with child generally suffered abortion, and were carried off by an uterine hæmorrhage.*

According

* Bonetus relates, that in 1676 in a malignant fever at Borgo di Sasia, the patients discharged live worms by the mouth, and adds that they were sooner killed by wine than any thing.

According to Sydenham, the plague begins with chilliness and shivering, like the fit of an intermittent, succeeded in a little time by violent vomiting and oppression at the breast, accompanied with its common symptoms. These continue till the disease proves mortal, or the kindly eruption of a bubo or parotis discharges the morbid matter. Sometimes, though rarely, the disease is not preceded by any fever; the purple spots, which denote immediate death, coming out even while persons are abroad about their business. But this hardly ever happens but in the beginning of a very fatal plague, and never while it is on the decline, or in those years in which it is not epidemic. Sometimes swellings appear without having been preceded either by a fever or any other considerable symptom; but he conceives that some slight and obscure shivering always precedes the seizure.

Mariti, in his travels through Cyprus, &c. says that the plague of 1760 began with loss of appetite, pain in the shoulders, head-ach extremely violent, delirium, vomiting, with a most excruciating pain in that part where the tumour by which the plague is characterised, is about to break forth. Death often took place on the third day, and very few lived beyond the thirteenth.

The Abbe's definition of what he calls the plague, and which seems to be the *pestilential bubo* of the physicians, is somewhat singular. "The plague (says he) is an ob-
 " long tumour, shaped like a pumpkin, which is at first
 " of a flesh colour; but it gradually becomes red, and
 " at length blueish; and this is a sign that the disease
 " is incurable. If it continues red, and a little after in-
 " clines to yellow, it is a sign that a suppuration will
 " take place: the swelling is then opened, and the pa-
 " tient is sometimes cured."

According to our author, the symptoms of the plague do not appear till fifteen days after the infection is received; and this is the reason of a law which subjects to a proof of twenty days every person suspected of being diseased. In this plague it was observed that people of the soundest constitutions were the most subject to it,
 and

and the least capable of resisting it. On the other hand, it appeared to spare weak and delicate persons, whose cure, in case of an attack, was much less difficult. A greater number of Moors than of any other nation were attacked by it; and when once they were seized, their case was absolutely desperate. Those who had recovered from the disease were less liable to a second attack, but were not absolutely safe. "I have known some (says our author) who have been ill seven times, and have died of it at last."

Dr. M'Bride informs us that in the plague which raged at Marseilles and the adjacent places in 1720, people on their first seizure seemed as if intoxicated with drink; they lost the power of their limbs entirely, and became so dejected that they gave themselves over to despair from the very first attack. Along with the bilious vomitings and purgings which generally took place on the second day, quantities of small worms like ascarides were thrown off. The more plentiful these evacuations were, the more salutary; for those who vomited and purged but little sunk down, oppressed with the disease, and died before the fourth day, covered with livid blotches and petechiæ; those who had the largest evacuations had also the most plentiful eruptions of buboes and parotid abscesses. When these appeared, the patients rose, walked about, and became remarkably hungry; the heat and thirst subsided, but the face continued pale and languid, the pulse hard and frequent. On the sixth, seventh, or eighth day, if the suppuration stopped, and the humours went back, then came on oppression, difficulty of breathing, furious delirium and convulsions, which ended in death. When carbuncles, or biles, with mortified sloughs, appeared in different parts of the body, either alone or accompanied with the glandular swellings, the patients scarcely ever escaped. In great numbers of people tumours appeared without any previous febrile symptom, and, in a few cases, went off by resolution; in others they continued in a schirrous state; but it was best when the tumours came to suppuration.

These

These are the most remarkable symptoms of this fatal disease, which have been recorded by the physicians of greatest eminence who have written upon the subject. It remains still to give some particular description of the buboes and carbuncles, which are supposed to constitute in a particular manner the characteristic signs of the distemper. Of these the following account, given by Dr. Alexander Russel, seems to be sufficiently clear and explicit.

Only a very few, and such as died suddenly, were exempted from buboes, but only about one half had carbuncles. In the latter plagues their proportion was still smaller; but they seldom appeared earlier than in the months of April or May. In 1742 and 1743, the buboes often appeared on the first commencement of the distemper, sometimes not till twelve hours after; in a few instances not till two or three days; but in 1744 they were sometimes the first symptoms of the disease. The buboes were generally solitary, the inguinal and axillary more frequent than the parotid. "The inguinal bubo for the most part was double; that is, two distinct glands swelled in the same groin. The superior, which in shape somewhat resembled a small cucumber, lay obliquely near the large vessels of the thigh, lower than the venereal buboes are usually found, and it was that which commonly came to suppuration; the inferior was round, and in size much smaller. I once met with a case in which an axillary bubo divided in like manner into two parts, one of which got under the pectoral muscle, the other sunk deeper into the armpit: both grew painful and inflamed, but that in the armpit only suppurated."

The bubo was at first a small hard tumour, painful but not inflamed externally. These indurated glands were deeply seated, sometimes moveable, at others more or less fixed, but always painful to the touch. Sometimes they would increase to a considerable size in a few hours, with intense pain, then suddenly subside; and these changes would take place several times in twenty-four hours. "An exacerbation of the pestilential symptoms

“toms immediately upon the decrease of the bubo, sometimes prompted me to imagine it owing to the recession of the tumour ; but this did not happen so constantly as to make me think it was so in reality. The buboes, as far as I could learn, never advanced regularly to maturation till such time as a critical sweat had carried off the fever. In ten, twelve, or fifteen days, from the first attack, they commonly suppurated ; having been all along attended with the usual symptoms of inflammatory tumours. But I have known them sometimes, nay, frequently, disappear soon after the critical sweat, and discede completely without any detriment to the patient. At other times, though grown to a pretty large size, the tumour, about the height of the disease, would sink and mortify, without any fatal consequences ; for, as soon as the crisis was complete, the mortification stopped, and the gangrened parts separating gradually, left a deep ulcer, which healed without difficulty. I met with no instance of a bubo in which fever did not either precede or follow the eruption.”

On the subject of carbuncles, Dr. Patrick Russel observes, that “there are certainly varieties in them, but perhaps these varieties have been unnecessarily multiplied, from the same eruption having been viewed in different stages of its progress ; for all of them sooner or later are covered with a black eschar.” Dr. Alexander Russel describes them as follows : “The carbuncles were commonly protruded the second day of the disease ; and though the muscular and tendinous parts were more especially affected, no part whatever could be said to be free of them. The carbuncle at first resembled an angry confluent pock in its inflammatory stage, but was attended with intense, burning pain, and surrounded by a circle of a deep scarlet hue, which soon became livid. By a progress very rapid, it then spread circularly, from the size of a silver penny to an inch and an half, two inches, nay, even three inches, diameter ; and the supervening gangrene often penetrated deep into the substance of the parts affected.”

“ In

“ In such of the sick as recovered, the gangrene usually
 “ ceased spreading on the third day ; and, a day or two
 “ after, signs of suppuration were observed at the edge of
 “ the black crust, the separation of which, advancing
 “ gradually, was completed rather in less time than that
 “ of the eschar in issues made by caustic. In cases where
 “ the patient died, I was informed (for I saw none of
 “ those cases myself) that a quantity of ichorous matter
 “ oozed from beneath the eschar, which remained itself
 “ shrivelled and hard, without any favourable signs of
 “ separation or digestion.”*

Dr. Alexander Ruffel also describes another kind of pustule, which he says appeared in a small number of the sick, but which his brother Dr. Patrick had no opportunity of observing in 1760. It had no livid or discoloured circle surrounding it, but was filled with laudable pus ; and, when dry, the crust fell off, as in the distinct small-pox. This was looked upon as a favourable symptom, all who had it happening to recover.

We have now detailed, at considerable length, the symptoms of the plague as mentioned by authors of great eminence. To give a detail of *all* that has been said upon

* “ Dr. Gotwald, formerly quoted, describes four varieties of carbuncles, the differences between which seem to be pretty distinctly marked. 1. “ One kind rises pretty high, is of a dark brown colour, the cuticle appearing as if it were burnt, and it is surrounded with a lead-coloured circle. In the beginning it is no bigger than a pea, but, if not prevented, soon grows to the size of a crown piece; inwardly it is moister than the rest, and may be more easily separated. Its seat is generally in the fleshy parts, as on the shoulders, neck, hips, arms and legs. 2. The second lie a little deeper, and do not rise so high; the eschar in the middle is entirely dark and ash-coloured, full of small chops, as if it would burst by too great dryness: it has a strong lead-coloured circle, behind which the sound flesh looks red and shining. It eats into the flesh round about it, and takes deep root: it generally fixes in the most fleshy parts, as the buttocks, calves, &c. 3. The third is not very large at first; it appears like a blood swelling, not so dark as the former, with a wrinkled skin; as it increases, small blisters arise in the middle, and form an eschar, in little clusters, which, as an ingenious physician observed, were small carbuncles. They commonly are situated in membranous and tendinous parts about the knees, toes, and behind the ears, &c. 4. The fourth is the most curious, as Purman, in his treatise on the plague, has well observed. Sitonius calls them pale, livid, ulcerous papulae: they appear with a high, yellowish blister, which seems full of corruption: the circle round it is first red, then of an ash colour: the blister soon falls, and, with the carbuncle, appears scarce so big as a pepper corn, continually eating deeper and wider. They are seated upon the cartilaginous or gristly parts. Gotwald found them near the pit of the stomach, upon the cartilago ensiformis and short ribs. All the four take root and burn very violently at first, but the two former most of all.”

upon this subject would be impossible; neither indeed can it be thought necessary in the present treatise. Whatever may have been omitted or too slightly mentioned in this section, will naturally be considered when we come to treat of the cure. It now therefore only remains to say, whether the approach of a plague may be known by any visible signs, so that people might in some measure prepare themselves for the ensuing calamity.

Were we in possession of an accurate and authentic history of the world, this question might be very easily decided; but the uncertainty of ancient records, the mutilated state of those which we do possess, the diversity of opinions among mankind, and the unhappy disposition to *misrepresent*, so common in all ages, render it very difficult to say any thing upon the subject. If the theory hinted at in this section (that plagues arise from some commotion in the electric fluid) can be allowed to have any foundation in nature, then it ought to follow, that the forerunners of pestilence would be some electric phenomena; and, from a perusal of the first and second sections of this work, it will appear that such an opinion is not altogether unfounded.*

The appearance of immense numbers of insects has likewise been accounted a sign of approaching pestilence; but if we suppose their appearance to be a *sign*, we can scarce imagine their putrefaction to have been a *cause*, of pestilence. In the east we are informed by Dr. Ruffel that the inhabitants of Aleppo account the appearance of insects, and even *eclipses*, as presages of the plague. They suppose also that the stillness of frogs is a sign of pestilence; but the same author informs us that all these signs failed in 1760. Violent earthquakes and famines seem to be more certain signs, though even these are not always to be depended upon; it being evident from historical accounts that pestilence has sometimes preceded, and sometimes followed, earthquake and famine. Mr. Gibbon, however, ascribes to the above-mentioned causes, viz. insects, earthquakes, and even
comets,

comets, the dreadful plague which took place in the reign of Justinian. At least, all these preceded it; but perhaps the *insects* were only meant to be accounted the cause of the plague. The cause of the *insects* must remain in obscurity. According to him, "In a damp but "stagnating air, this African fever is generated from "the putrefaction of animal substances, and especially "from the swarms of locusts, not less destructive to mankind in their death than in their lives."

This dreadful plague was preceded by comets and most violent earthquakes. A remarkable comet appeared in 536, supposed to be the great one observed by Sir Isaac Newton in 1680. This, we are told by astronomers, revolves round the sun in a period of 575 years; but the failure of astronomical predictions in the return of the expected comets of 1759 and 1789, shew the futility of such calculations. Another comet appeared in 539, and these comets were attended with an extraordinary paleness of the sun. Mr. Gibbon observes, that earthquakes, which he calls a fever of the earth, "raged with uncommon violence during the reign of "Justinian. Each year is marked by the repetition of "earthquakes of such character, that Constantinople has "been shaken above forty days; of such extent, that "the shock has been communicated to the whole surface of the globe, or at least of the Roman empire. "An impulsive or vibrating motion was felt; enormous "chafms were opened, huge and heavy bodies were discharged into the air, the sea alternately advanced and "retreated beyond its ordinary bounds, and a mountain "was torn from Liburnia, and thrown into the waves, "where it protected as a mole the new harbour of Botrys in Phenicia."

According to Dr. Sydenham the plague at London in 1665 was preceded by a very cold winter; the first continued till spring and went off suddenly towards the end of March. Peripneumonies, pleurifies, quinsies, and other inflammatory disorders, then made their appearance, along with an epidemic fever of a particular kind, which did not yield to the remedies successful in other epidemics.

epidemics. About the middle of the year the plague began, and increased in violence till the autumnal equinox, when it began to abate, and by the ensuing spring was entirely gone. Our author says that the plague seldom rages violently in England but once in thirty or forty years; but since his time, which is upwards of a century, no plague hath appeared. He supposes the plague and other epidemics to depend on some secret constitution of the air, but pretends not to say what that constitution is. But, besides this constitution, he is of opinion that there must be another circumstance, viz. the receiving the effluvia or seminium from an infected person. Thus he supposes that a single infected person is sufficient to poison a whole country; the general mass of atmosphere being infected by the breath of the diseased and the effluvia of the dead bodies. "Thus (says he) the way of propagating this dreadful disease by infection is rendered entirely unnecessary; for though a person be most cautiously removed from the infected, yet the air received in by breathing will of itself be sufficient to infect him, provided his juices be disposed to receive the infection. I much doubt, if the disposition of the air, though it be pestilential, is of itself able to produce the plague; but the plague being always in some place or other, it is conveyed by pestilential particles, or the coming of an infected person from some place where it rages, to an uninfected one, and is not epidemic there, unless the constitution of the air favours it. Otherwise I cannot conceive how it should happen, that, when the plague rages violently in one town in the same climate, a neighbouring one should totally escape it, by strictly forbidding all intercourse with the infected places; an instance of which we had some few years ago when the plague raged with extreme violence in most parts of Italy; and yet the Grand Duke, by his vigilance and prudence, entirely prevented its entering the borders of Tuscany." As to the nature of the disease, when once produced, Dr. Sydenham is of opinion that it is altogether inflammatory; for which he gives the following reasons: 1. The

Qq

colour

colour of blood taken away that resembles that in pleuritic and rheumatic disorders. 2. The carbuncles resemble the mark of an *actual cautery*. 3. The buboes are equally disposed to inflammation with any other tumours that come to suppuration. 4. The season of the year may be adduced in proof of this; for between spring and summer, inflammatory disorders, as pleurifies, quinifies, &c. are common.

Before we put an end to this section, it may now be proper to say a few words by way of apology for the many apparent digressions from the subject which have appeared in it. In the first place, then, the work being intended for general inspection, and not merely for medical readers, it became absolutely necessary to introduce a number of things which for medical readers would have been totally superfluous. It was to be supposed that the book might come into the hands of some who had not read any thing concerning the structure of the body, who had not heard of any of the systems of medicine now prevalent, or the different doctrines they contain. It was impossible to write in an intelligible manner for such people without giving some few hints concerning all these subjects: the same consideration made it necessary to enter pretty largely into the discoveries concerning the composition of the atmosphere and various kinds of elastic fluids, concerning heat, &c. In doing this the writer was under a necessity either to adopt some of the doctrines he took notice of, or to animadvert upon them. If he has ventured freely to give his sentiments, it is not with a view to establish a theory of his own, but to direct the attention of the reader to those natural agents which seem to be at present too much overlooked, principally because they are less accessible to our senses, and of consequence less subject to experiment, than others. If therefore in this treatise it is suggested that the atmosphere acts on the human body by its internal or latent heat, and by its electricity, as well as by its other properties; if the writer is inclined to believe that these are in fact the most powerful parts of it; that we never can act with-
out

out them, and that in short our life and health are in immediate dependence upon them; I say, that none of all these things are in opposition to any fact hitherto discovered, either of the medical kind or any other. On the other hand, in all ages physicians have sought for some constitution in the air, inexplicable, and perpetually unknown, to which diseases might be ascribed that could not be supposed to originate from any of its ordinary properties. To explore this constitution is as great a desideratum at the present moment as two thousand years ago; and any attempt to investigate it, or a conjecture relating to it, cannot be supposed inconsistent with any thing already discovered and ascertained. There are many things which lead us to think that electricity is very much concerned in diseases, and among the rest we must account the new discovery of Dr. Perkins's metallic conductors a very notable proof of it. These, when first ushered into the world, were made by many a subject of ridicule; but the evidence in favour of their efficacy, both in America and in various parts of Europe, seems now to be decisive in their favour; and, if they act at all, it is almost impossible to suggest any other principle than that of electricity to which their efficacy can be owing. No doubt it is difficult to draw the line properly betwixt credulity and skepticism, but where credible testimony determines any thing to have actually happened, or where solid reasoning gives room to suppose any thing to be probable, it never can be invalidated by any argument *a priori* formed against the *possibility* of such a thing taking place.

In page 128 it is said, that M. Lavoisier, by introducing the new chemical nomenclature, "has entailed the greatest curse upon the science it ever met with." An apology for this bold assertion is absolutely necessary, and the quotation made from Dr. Ferriar may be deemed inadequate, or perhaps misapplied. In passing this censure on the nomenclature I wrote from experience. The new nomenclature, instead of promoting *my* improvement in chemistry, hath had a direct contrary tendency. An instance of the inconvenience and ambiguity arising from

from it is given p. 135, when speaking of Dr. Girtanner's theory. But a much more remarkable example is to be met with in the review of Dr. Monro's Chemical Treatise, where we find him censured for the very same ambiguity taken notice of with regard to Dr. Girtanner. "He might have observed (say the reviewers) "the distinction between the hydrogen and inflammable air, and between the oxygen and pure air, as well "as between the azote and impure air: he has mentioned these as synonymous, whereas they are terms "that express bases, or substances in a concrete state " (what I have called the condensable part) and the compounds of these substances and heat, when they assume the form of gases or elastic fluids." (Monthly Rev. for 1790, p. 26.)

That the terms invented by Lavoisier and others have not been received with perfect unanimity by the chemists of the present day, is evident from Dr. Pearson's "Translation of the New Chemical Nomenclature," which is not only a *translation*, but a *vindication* of it. In the course of his work he quotes the translator of the Chemical Dictionary saying, that, "from the zeal of "reforming language, such a number of reformers may "arise, that our ears will not be less stunned, nor our "understandings less perplexed, than if we were exposed to the clamour of Babel, or the *thaw of words* of "Sir John Mandeville." To this Dr. Pearson replies, that there is no reason to fear any such bad consequences. "The distinguished superiority of a system produced by "a *De Guyton*, a *Lavoisier*, or a *Bergman*, would surely "supercede the work of persons of *inferior ability*." It is impossible to know the persons here designated, unless the Doctor points them out. If he chooses to call *himself* one of them, we can have no objection. He certainly has dissented, in one article, from "the system produced by *De Guyton*, *Lavoisier* and *Bergman*," and this is with regard to the word *azote*. This is the term announced to us as the most proper for denoting a certain kind of air. But Dr. Pearson determines *nitrogen* to be more proper. Even this has not given entire satisfaction,

tion, for Dr. Mitchell has adopted the word *septon* in preference to both *azote* and *nitrogen*. Thus, instead of the original phrase *phlogisticated air*, used by Dr. Priestley, we have four ; for as long as the works of Dr. Priestley remain, the original term will be used by some, while with others it will be so much disused that perhaps they will not understand it when it happens to occur. Nor are corrections of this kind all that we have to fear. Professor Wiegleb, who has written a *System of Chemistry* in quarto, has therein changed almost all the nomenclature invented by Lavoisier. Instead of it he gives a nomenclature of his own, in which he makes very much use of the termination *cratia*, from a Greek word signifying strength ; thus, instead of saying the *acid of fluor*, we are to say *fluoricratia*. I must confess that to me the perpetual repetition of this termination has a very ridiculous appearance ; but the misfortune is, that in the case of nomenclatures we have no choice. We cannot choose one and reject another : good or bad, we must take both ; and were an hundred new ones to arise, we must be condemned to learn them all. Nor is even this the worst. Wiegleb's scholars, for instance, accustomed to the language of their teacher, will be apt to put it into their writings, perhaps without proper explanation ; and thus such writings must be unintelligible both to old and new chemists : and thus it will be with as many others as choose to invent new chemical terms.

Were this a proper place for entering into a discussion of Lavoisier's nomenclature, it might easily be shown that the terms are not more proper than those which preceded them ; but no real inconvenience can arise from the propriety or impropriety of a mere name. It is the *resemblance* of the terms to one another, and the facility with which mistakes may be made, that gives just ground of complaint. Nor is it any just reason to accuse a person of want of judgment or carelessness because he hath mistaken these terms. We see that even Dr. Monro has not attended to every circumstance ; and if a man of his experience and accuracy hath been inaccurate in this respect, what is to be expected from others ? How easily

easily may the words *sulfate*, *sulfite*, *sulphuret* and *sulphure*, be mistaken for one another, either in writing or conversation! Yet a mistake of this kind would totally pervert the meaning of the person who used it. The scripture finds fault with those who make people offenders for a *word*; but here we are in danger of being made offenders for a *letter*. In short, taking into account the inconveniences arising from this nomenclature itself, the numberless corrections and amendments (no matter whether real or imaginary) to which it may be subjected, and the number of others totally different from it which may arise, I cannot help looking upon the introduction of it into chemistry as an evil of the first magnitude; an evil which cannot be remedied by any art, but must continually become worse and worse.

SECTION IV.

Of the best Methods of Preventing the Plague.

THESE methods may be classed in the following manner: 1. Those most proper for avoiding the infection, supposing the disease to be infectious. 2. The proper mode of resisting or removing those local causes which may give rise to it, or may co-operate with the infectious matter in giving greater force to the disease, should it happen to be introduced; and, 3. The best method of preparing the body for resisting pestilential attacks, should we happen to be so situated that no external method of defence could be used.

With regard to the first of these intentions the flying from places infected has been so universally recommended, and so generally received, that the precept has been made up into the following proverbial Latin distich:

"Hæc tria tabificam tollunt adverbia pestem

"Mox, longe, tarde, cede, recede, redi."

*These words prevent the plague's infectious pain,
Go quick, fly far, and slow return again.*

This maxim hath been put in execution in all ages, but often with so little regard to humanity that it cannot

not by any means be recommended without very considerable limitation. The separation of the sick from all promiscuous intercourse with the sound, in times of pestilence, seems to be dictated by common sense ; but this may be done without killing them, or leaving them to expire in the miserable state to which they are reduced by the disease. Mr. Howard informs us that in some places ships which have the plague on board are chased away and burnt ; and instances of cruelty with regard to infected individuals have been formerly mentioned. Dr. Mer-tens is of opinion that cutting off all the communication between the infected and healthy is the only means of preventing the disease from spreading. The good of this practice was observed in one of the hospitals at Moscow. All the avenues to it were shut up, but one which was strictly guarded, and every suspected article prohibited from entering. Infected clothes and utensils were burned, and the houses where the sick had lived were purified by the fumes of vinegar and gun-powder.

In this mode of prevention it is of the utmost consequence to ascertain the distance to which the contagion extends ; in the next place to know whether by means of clothes, cotton or other kinds of merchandise it may be imported from one place to another ; and in the third place how long the infection may remain in these kinds of goods ; so that people may know when the danger is over. As to the distance, it seems to be generally agreed, that it is but small. Some of the answers to Mr. Howard by the physicians of whom he inquired, have been already related. Of the infection of the plague he speaks in the following manner :

“ In my opinion this distemper is not generally to be
“ taken by the touch, any more than the gaol-fever or
“ small-pox ; but either by inoculation, or by taking
“ in with the breath the putrid effluvia which hover
“ round the infected body ; and which, when admitted,
“ set the whole mass of blood into fermentation, and
“ sometimes so suddenly and violently as to destroy its
“ whole texture, and to produce putrefaction and death
“ in 48 hours. Those effluvia are capable of being
“ carried

“ carried from one place to another, upon any substance
 “ where what is called *scent* can lodge ; as upon wool,
 “ cotton, &c. and in the same manner that the smell of
 “ tobacco is carried from one place to another.”

“ The infection in the air does not extend far from
 “ the infected object, but lurks chiefly (like that near
 “ carrion) to the leeward of it. I am so assured of this,
 “ that I have not scrupled going, in the open air, to
 “ windward of a person ill of the plague to feel his pulse.
 “ The rich are less liable to the plague than the poor,
 “ both because they are more careful to avoid infection,
 “ and have more large and airy apartments, and because
 “ they are more cleanly, and live on better food, and
 “ plenty of vegetables ; and this I suppose is the reason
 “ why Protestants are less liable to this distemper than
 “ Catholics during their times of fasting, and likewise
 “ why the generality of Europeans are less liable to it
 “ than the Greeks, and particularly Jews.

“ It is remarkable that, when the corpse is cold of a per-
 “ son dead of the plague, it does not infect the air by
 “ any noxious exhalations. This is so much believed
 “ in Turkey, that the people there are not afraid to han-
 “ dle such corpses. The governor of the French hos-
 “ pital at Smyrna told me, that, in the last dreadful
 “ plague there, his house was rendered almost intolerable
 “ by an offensive scent ; especially if he opened any of
 “ those windows which looked towards the great burying-
 “ ground, where numbers every day were left unburied ;
 “ but that it had no effect on the health of himself or
 “ family.”

It is likewise a matter of the utmost importance to
 ascertain the time at which the disease is introduced into
 any town or district. Dr. Canestrinus, in a treatise on
 this distemper, published at Saltzburg, complains greatly
 of the dissensions among physicians concerning the na-
 ture of the distemper, owing to which its existence is
 frequently denied, and thus its ravages are propagated
 immensely beyond the limits which might otherwise
 circumscribe them. Of this he gives the following re-
 markable instance : “ In the year 1770 a disease with
 “ uncommon

" uncommon symptoms prevailed at Bodrogh in Up-
 " per Hungary, which carried off a number of persons
 " in a short time. A physician of the county of Zem-
 " plin was sent to inquire into the nature of the malady.
 " He reported that the disease was of a suspicious na-
 " ture, having a great resemblance to the plague. His
 " report was received by the nobility and health-officers
 " with indignation, as if untrue. Another was sent,
 " who, without hesitation, pronounced the disease an
 " epidemic scurvy. In the mean time the disease, be-
 " ing left to itself, spread wider, and raged with such
 " violence as to carry off seventeen persons in one house.
 " The nature of the disease now becoming apparent,
 " proper measures were taken, and the infected sepa-
 " rated from the sound, by which means the disease was
 " confined within a small district.*" With regard to
 the infection of the disease, or *contagion*, as it is com-
 monly called, he expresses himself as follows: " The air
 " is not capable of diffusing the contagion to any con-
 " siderable distance from the infected subject unimpaired
 " in its power, but, like other poisonous matter, it is
 " capable of dilution in the atmosphere, so as to be
 " rendered at length innoxious. The contagion of the
 " plague will be entirely prevented from spreading if ail
 " access to, and all intercourse with, the sick be strictly
 " prohibited: whence the following forms a safe and
 " infallible prophylactic of the disease:

" Mox, longe, tarde, cede, recede, redi.

" Go quick, fly far, and slow return again."

" No change in the habit takes place previous to the
 " action of the contagion, but the body is from the first
 " equally susceptible of it as of the itch, or any other
 " infectious disease. Whilst the plague ceases in the
 " civilized parts of Europe spontaneously, or by human
 " precautions, its revival is prevented, from the care that
 " is bestowed in purifying or destroying every infected
 " substance. In the east, on the contrary, this precau-
 " tion is totally neglected; whence it is probable that
 " the disease is not reproduced anew, but that it is per-
 " petuated

* Medical Review, vol. iii, p. 257.

“petuated by the former fomes, as happens with us in
“the small-pox. The matter producing the ordinary
“epidemics is widely diffused in the atmosphere, and
“capable of infecting through a widely extended space.
“The pestilential poison, on the contrary, is confined to
“the vicinity of the affected body, and becomes so dilute
“at the distance of a few paces only as to be incapable of
“further action. Hence it appears that the plague is
“much easier avoided than epidemic disorders. The
“more abundant the contagious matter is, the further
“probably is the power of its infection carried. This
“is the reason that the mere separation of the sick and
“suspected from the healthy is so much more efficacious
“in destroying it at its commencement than at a later
“period. To restrain epidemics within bounds is impos-
“sible; but with the contagion of the plague, it is cer-
“tain that it can be confined by art to a narrow spot.”

Of the truth of this last assertion our author gives a remarkable, instance in his own practice about the time that the plague stopped at Bodrogh. Having been sent into Cassovia, along with two other physicians, they were informed by the surgeon of the lazaretto, that an unusual disease had broken out in the district of Zboina, which had suddenly proved fatal to many. On inquiry it was found that it had come from Bodrogh in the following manner: Two young men, returning from the vintage at Tokay, slept a night in an infected house, and stole some clothes belonging to those who had died of the plague. He who carried the clothes died by the way: his father carried home the bundle, kept them unpacked for some weeks, but having at last worn them, he and all his family fell victims to the same disease. The pestilence began to spread, and shewed an appearance of great malignity. Our author did not hesitate to declare its true nature, and in consequence of his declaration all communication was cut off between the adjacent countries and the infected spot, by a cordon of the military. The infected were separated from such as were only suspected, and these last from the sound: three infected houses were destroyed by fire, and other means

means (to be afterwards related) were used with a view to destroy the contagion itself. Thus the disease was prevented from spreading; and none but such as had been previously suspected were seized.

To the same purpose the Abbe Poiret thinks it an easy matter to extinguish the plague entirely. He was a witness to the ravages of the disease in Barbary, and thinks it the most easily avoided of any distemper; but the misfortune is, that there are many things in their own nature very easily accomplished, which the inattention or perverseness of mankind render utterly impracticable. Such, it is to be feared, is the extinction of the plague by the means just mentioned; for though these means might be enforced in a country district or small town, yet, where the pestilence enters a large and populous city, there are so many modes of concealing its existence, and the unknown intercourse of the sick with the sound must be so frequent, that it seems scarce possible to prevent the malady from spreading.

In London, whether it arose from a neglect of using the precautions for too long a time, or from any other cause, cannot well be known; but the attempts of the magistrates to separate the sick from the sound certainly were not attended with any good consequence. "The consternation (says Dr. Hodges) of those who
"were thus separated from all society, unless of the infected, was inexpressible, and the dismal apprehensions
"it laid them under made them but an easier prey to the devouring enemy. And this seclusion was on this
"account much the more intolerable, because, if a fresh
"person was seized in the same house but a day before
"another had finished the quarantine, it was to be performed over again; which occasioned such tedious
"confinements of sick and well together, as sometimes
"caused the loss of the whole. Moreover, this shutting up of infected houses made the neighbours fly
"from theirs, who might otherwise have been a help to
"them on many accounts; and I verily believe that
"many who were lost might have been alive, had not
"the tragical mark upon their doors driven proper assistance

“ tance from them. And this is confirmed by the exam-
“ ples of other pestilential contagions, which have been
“ observed not to cease until the doors of the sick were set
“ open, and they had the privilege of going abroad.”
The Doctor sets forth also the arguments on the other
side ; but whatever *might* have been the advantages of
a separation of the sick from the healthy, if conducted
in a manner less capable of hurting the feelings of hu-
manity, it is evident that in the London plague the
methods attempted to prevent the disease at least did
no good.

In countries where the plague generally prevails, and
the Europeans are *united* in the opinion that it is neces-
sary to separate themselves from the natives, the method
of shutting up is attended with the most salutary effects,
as has been attested by almost every traveller who has re-
sided there for any time. Accidents among them are
very rare, though not altogether without example. At
Alexandria in Egypt, M. Volney tells us, that as soon
as the plague makes its appearance the European mer-
chants shut themselves up in their *khan*s and have no
communication with the rest of the city. Their provi-
sions are deposited at the gate of the *khan*, and received
there by the porter, who takes them up with iron tongs,
and plunges them into a barrel of water provided for the
purpose. If it is necessary to speak to any one, they
keep at such a distance as to prevent touching with their
clothes, or breathing on one another ; by which means
they preserve themselves from this dreadful calamity, un-
less by some accidental neglect of these precautions.
Some years ago a cat, which passed by one of the terraces
into the houses of the French merchants at Cairo, convey-
ed the plague to two of them, one of whom died. This
state of imprisonment continues for three or four months,
during which time they have no other amusement than
walking in the evening on the terraces, or playing at
cards.

The doctrine of predestination, and still more the bar-
barism of the government, have hitherto prevented the
Turks from attempting to guard against this destructive
disease :

disease: the success, however, of the precautions taken by the French, has of late begun to make some impression upon many of them. The Christians of the country who traffic with the French merchants, would shut themselves up like them; but this cannot be done without permission from the Porte. A lazaretto was some years ago established at Tunis; but the Turkish police is every where so wretched, that little can be hoped for from those establishments, notwithstanding their extreme importance to commerce and the safety to the Mediterranean states. The very last year afforded a proof of this; for as violent a plague as ever was known broke out there. It was brought by vessels coming from Constantinople, the masters of which corrupted the guards, and came into port without performing quarantine. Water carriers have never been attacked by it.

Mariti says, that in the island of Cyprus, and on the continent of Syria, every European, on the slightest appearance of the plague, after taking the necessary precautions, shuts himself up with his family. The Mahometans alone, more intrepid, go abroad as usual, converse with each other, give such assistance to each other as may be necessary, and often fly to the relief of a Christian when deserted by his friends. This arises from their belief in predestination. The Mahometans of Syria, however, less familiarized with this scourge, make use of some precautions, which were augmented in 1760. They published an ordonnance forbidding every vessel attacked by the plague to enter their ports: but their vigilance in this respect was so remiss, that it was not sufficient to prevent the contagion. The governor of Acre checked the progress of this plague, by giving the inhabitants the means of retiring from its ravages; and these means, though absolutely contrary to the dogmas of the Mahometan religion, were eagerly embraced. The Europeans became their models; and the governor, after deriving from them every necessary information, shut himself up, after their example, together with his numerous family. The musti alone, being the protector of the Mahometan law, cannot imitate a conduct which
that

that law condemns. Instead of shutting himself up in a prudent confinement, he thundered forth against this new method, reproached the governor for his conduct, and, having treated him as an impious person, threatened him with all the vengeance of Heaven. The governor, however, only laughed at this pious folly of the mufti, and sent a detachment of soldiers to impose on him a fine of two hundred and fifty sequins, for having dared to ascribe to him, in matters of religion, an ignorance, from every suspicion of which his age ought to have secured him.

In the time of plague, the proper precautions are, to shut one's self closely up, and to receive no provisions or other things, except those on which the plague has no influence. The people of Syria, however, in 1760, admitted every kind of provisions without fear, but not without using certain precautions. They did not receive warm bread; flesh of every kind was thoroughly washed, and milk was strained through a linen cloth, in order to free it from the smallest particle of animal hair. All kinds of pulse were soaked in water, and they abstained from peaches, apricots, and other fruits which are covered with a downy rind. Fowls were cooked out of the house, for fear that some small feather might adhere to them. Flowers were altogether proscribed. Letters were opened by the person who brought them; and they were never read until they had been steeped long enough in vinegar to be purified without effacing the writing. Every thing was received into the house by means of a rope of herbage suspended from a window. The governor employed every precaution which he thought likely to guard him from the contagion; and, by shutting himself closely up, he set an example which the rest of the Mahometans did not neglect to follow. Besides this he caused the streets to be cleansed; and carried his vigilance so far as to forbid the caravans which arrived from Damascus, where the plague swept off four or five thousand people every day, to enter the city. He obliged them to submit to a proof of eight days without the walls, and established regulations of the same kind respecting vessels coming

coming from Alexandria or Damietta. One precaution taken in the time of plague is, to prevent *cats* from entering houses : an open war is therefore declared against these animals ; and, wherever they are found, they are knocked on the head with large clubs. This is a cruelty absolutely necessary ; for there is no vehicle that will convey the infection with more certainty or rapidity than the hair of cats. Rats and mice multiply in consequence of their destruction ; but there is no instance of their ever having propagated the plague. This disease, when it attacks men, spares quadrupeds and birds. The furs of the one, and the feathers of the other, however, attract and communicate the infection. People ought particularly to keep from goats and sheep ; from horses and oxen little is to be apprehended.

All these precautions were sometimes ineffectual. The French at Acre, who there, as well as throughout Syria, are collected into one quarter, used every precaution that could be thought of, yet, on the 30th of March, 1760, five of them were infected. They belonged to the hospital of the Holy Land, and the monks were instantly ordered to shut themselves up. They did so ; and eight of them died, one only escaping.

Mr. Howard likewise gives particular accounts of the precautions used in several different countries through which he travelled. In Malta two kinds of quarantine are performed ; one for ships with clean bills, the other for those with foul. The former lasts 18 days.* The crews and passengers are allowed to buy provisions, and converse by means of enclosures with stone posts and palisadoes. A letter received from a Turkish ship was taken by a pair of iron tongs, dipped in vinegar, put into a case, and laid for about a quarter of an hour on a wire grate under which straw and perfumes had been burnt ; after which the letter was taken out and opened by one of the directors. In this island ships with foul bills must perform quarantine eighty days ; but, at the end of forty, may change their station. The different kinds of goods are separated and placed in proper order under cover.

* At Aleppo 20. (Russet.)

cover. The cottons are taken out of the bags containing them, and placed on rows of piles on boards, laid on stone pillars about 18 inches from the floors; and, in repacking them they are flung over a man who gets into the bags, and treads down the cotton; the consequence must be the exposing him to great danger, should any infection remain.

Mr. Howard took a voyage to Venice in a ship with a foul bill, on purpose to know every thing relative to the performance of quarantine. "A messenger (says he) came in a gondola to conduct me to the new lazaretto. I was placed, with my baggage, in a boat fastened by a cord ten feet long to another boat in which were six rowers. When I came near the landing place the cord was loosed, and my boat was pushed with a pole on the shore, where I was met by the person appointed to be my guard. Soon after unloading the boat, the sub-prior came and showed me my lodging; a very dirty room, full of vermin, and without table, chair or bed. That day and the next morning I employed a person to wash my room; but this did not remove the offensiveness of it, or prevent that constant head-ach which I had been used to feel in visiting other lazarettos and some of the hospitals in Turkey. My guard sent a report of my health to the office, and, on the representation of our consul, I was removed to the old lazaretto. Having brought a letter to the prior from the Venetian ambassador at Constantinople, I hoped now to have had a comfortable lodging. But I was not so happy. The apartment, consisting of an upper and lower room, was no less disagreeable and offensive than the former. I preferred lying in the lower room, on a brick floor, where I was almost surrounded by water. After six days, however, the prior removed me to an apartment in some respects better, and consisting of four rooms. Here I had a pleasant view; but the rooms were without furniture, very dirty, and no less offensive than the sick wards of the worst hospital. The walls of my chamber, not having been cleaned perhaps for half a century,

“ century, were saturated with infection. I got them
“ washed repeatedly with boiling water, to remove the
“ offensive smell, but without any effect. My appetite
“ failed, and I concluded I was in danger of the slow
“ hospital fever. I proposed whitewashing my room with
“ lime flaked in boiling water, but was opposed by
“ strong prejudices. I got this, however, done one
“ morning through the assistance of the British consul,
“ who supplied me with a *quarter* of a bushel of fresh
“ lime for that purpose. The consequence was, that
“ my room was immediately rendered so sweet and fresh,
“ that I was able to drink tea in it in the afternoon, and
“ to lie in it the following night. On the next day the
“ walls were dry, as well as sweet, and in a few days I
“ recovered my appetite. This room was lime-whited in
“ November, and in a very rainy season. In the fol-
“ lowing March, in complaining to the under sheriffs in
“ Newgate of their inattention to the clause which or-
“ ders this in the act of parliament for securing the
“ health of prisoners, their excuse was, that they were
“ afraid of dampness.”

An health-office was established at Venice in 1448, in the midst of a very destructive pestilence. The old and new lazarettos are both built on little islands, surrounded not only by canals, but high walls. They have only a ground floor, and one over it, and are divided and subdivided into a great number of apartments, each having an open court in front, with plats of grass, which is not suffered to grow too high; nor are any trees suffered to grow within this district, or a good way from it. The internal government is managed by a prior, who must not be related to the magistracy nor any of its ministers. He must have no interest nor concern in shipping nor in trade. He must see all the gates and doors of the apartments locked every evening by sunset; he takes the keys into his possession, and suffers them not to be opened before sunrise; and, in case of any suspicion of infection, the gates must be kept constantly locked, and opened only for necessary occurrences in presence of the prior. He must not suffer

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dogs,

dogs, cats, &c. to lodge in the lazaretto. He must neither buy nor sell, nor suffer others to do so, within the lazaretto. No fishing boats or other small craft to come within a certain distance, or keep communication with those performing quarantine. Provisions are received by poles seven or eight feet long, and the money dipped in vinegar and salt water before it is received. The prior and his substitute must carefully avoid touching either goods or passengers in quarantine, and for this purpose they keep a cane to make those who approach them keep their proper distance ; but if by an unfortunate accident they should be contaminated, they must perform quarantine. Any person maliciously touching them is liable to punishment.

Ships are strictly forbid to use any ropes but such as are tarred. Wool, silk, cotton-wool, woollen and linen clothes, and furs especially, are accounted the most dangerous goods. Animals with long hair are subject to full quarantine ; but short haired ones purged by swimming ashore ; feathered animals, by sprinkling with vinegar till wet.

The celebrated Dr. Mead, though an enemy to the cruel mode of abandoning the sick, or treating them with any kind of harshness, was perfectly sensible of the necessity of using every precaution for preventing pestilential contagion from being imported. In his opinion it is not sufficient that ships should perform quarantine, “ the only use of this being to observe whether any die “ among them. For infection may be preserved so long “ in clothes among which it is once lodged, that as “ much, nay, more of it, if sickness continues in the ship, “ may be brought on shore than at the beginning of the “ forty days, unless a new quarantine be begun every “ time any persons dies ; which might not end but with “ the destruction of the whole ship’s crew.” He is therefore of opinion that lazarettos ought to be established on small islands near the sea-coast ; and in this Mr. Howard agrees with him. The latter recommends the lazaretto at Leghorn as the best in Europe. Dr. Mead also very much insists on the utility of destroying the clothes

of the sick, because, says he, they harbour the very *essence of the contagion*. He quotes in favour of this opinion what Boccacio says he *saw* at Florence in 1348; viz. that two hogs, finding in the streets the rags which had been thrown out from off a poor man dead of the disease, after snuffling upon them, and tearing them with their teeth, fell into convulsions, and died in two hours. This is one of the things which Dr. Moseley looks upon to be incredible. It is indeed very marvellous, and seems to be contradicted by M. Deidier's account of the dog at Marseilles who swallowed with impunity the filthy pus and pestilential matter adhering to the dressings of plague sores: but, when a person of credit informs us that he *saw* any thing, we scarce know how to contradict him. The evidence of pestilential contagion adhering to clothes, does not depend on such accounts. That lately quoted from Dr. Canestrinus is decisive on the subject; and he informs us that one of the methods used by himself to stop the plague in Zboina, above mentioned, was, the burning of the clothes of infected persons. He says that the pestilential contagion resembles that of the small-pox, in being of a fixed nature; and that all who studiously avoided communication with the sick, or with whatever fomes might carry the contagion, escaped it altogether. "That the contagion of the plague (says he) may lie dormant for a considerable time, and be carried to a great distance by the medium of packages, &c. and again revive with its former violence, is proved by various circumstances. *Chenot* relates, in his treatise on the plague which raged in Transylvania, that the infection was revived a whole year after it had disappeared; and other similar instances are adduced." If this revival happened from infected clothes or soft goods, it shows them to be dangerous in the extreme; but of this we have not any direct proof, neither indeed is such a belief quite consistent with what takes place in all plagues, viz. that the clothes of the infected are worn by the sound, without producing any reinfection. In the great plague at London, for instance, where an hundred thousand probably perished, and a much greater number must have been

been infected, we cannot suppose that all the clothes belonging to such an immense multitude were burned, or never made use of again. It is of necessity therefore that we suppose the pestilential contagion to become effete, and to lose its virulence, after some time; and this seems to be very much hastened by exposure to the atmosphere. The doing of this, however, by obliging people to put their naked arms into bales of suspected goods, has such an appearance of cruelty, that Dr. Mead has proposed to judge of the presence or absence of infection by allowing little birds to fly about among them; "because (says he) it has been observed, in times of the plague, that the country has been forsaken by the birds; and those kept in houses have many of them died." But, though he says this upon very great authority, no less than that of Diemerbroeck, yet we can by no means look upon the fact to be absolutely determined. Dr. Ruffel indeed says that the desertion of the birds is looked upon by the Turks to be the *sign* of an approaching plague; but this failed in 1760. Thucydides says that birds of prey deserted the territory of Athens during the great plague in his time; and he supposes them to have been poisoned by feeding upon the bodies of such as died of the disease. It is possible that such food might be disagreeable to them, but no proof is brought of any of them having been actually poisoned by it. As for birds kept in houses, it is possible that in a time of general calamity they might have been neglected, and died for want of proper food, &c. Dr. Mead also quotes an instance which cannot be credited in a consistency with undoubted testimonies that pestilential contagion does not extend but for a very little way. Upon opening an infected bale of wool in the field near Cairo, "two Turks employed in the work were immediately killed, and some birds which happened to fly over the place dropped down dead." Such accounts have arisen from a supposition that the whole mass of atmosphere was violently infected; but this would be totally inconsistent with the life of any human creature, and we may well put down this, as that of pestilential infection

fection arising from cities like a cloud, as merely chimerical.* It is too well known that pestilential contagion, instead of soaring in the air, keeps very near the ground.

We now come to the second mode of prevention, viz. removing these local causes which, in the opinion of some, may produce a plague in any country, and, in that of others, may increase or set in action the contagion previously existing. These causes have been enumerated by the late Dr. Smith,† in a Dissertation on the pestilential Diseases which at different times appeared in the Athenian, Carthaginian and Roman armies, in the neighbourhood of Syracuse. They are, 1. The climate and season. 2. The situation of the armies; and, 3. Their condition. The climate of the island of Sicily in general he observes is extremely pleasant at some seasons of the year; in the neighbourhood of Syracuse particularly storms are so infrequent during the former part of the year, that the sun is never obscured for a whole day. Even in the month of January, however, the weather is warm, and as the season advances the heat becomes insupportable. In autumn it is rendered somewhat unpleasant and unhealthy by the frequent rains and chillness of the evenings. But, in particular places, during the hottest season, nothing can exceed its unhealthiness. According to Barichten, “the least stagnant water is sufficient, in the heats of summer, to poison the atmosphere: its effects on the countenances of the poor people who live in its vicinity are evident; and a stranger who travels through the island in this season ought to avoid ever passing a night near them.” De Non says, that “as soon as the sun enters the Lion, this country becomes the house of death: fevers of the
“ most

* About the mouth of the river Gambia in Africa, after the annual inundation of the river, the putrefaction of the mud, mixed with animal and vegetable substances, becomes so great, that the birds manifest their disgust by soaring to an immense height in the air. This is a natural consequence of the levity of putrefactive vapours compared with the common atmosphere. As these vapours, however, are composed of several kinds of gases, it is possible that some may descend, while others ascend; and thus the contagious part, tending to the earth, may violently affect the people who are confined among it, while the birds escape; but there is still wanting some positive evidence that ever the true plague did arise from this cause.

† Med. Repository, vol. ii, p. 367.

“ most malignant kind seize on the imprudent or unfortunate wretch that spends a night near them (ponds and marshes) and few escape with life when attacked by so virulent a disorder.”

To the poisonous effluvia of these marshes the Doctor attributes, in an especial manner, the plagues which took place in the armies. In the second year of the Peloponnesian war, the Athenian army was encamped, as we are told by Thucydides, “ upon marshy and unwholesome ground ;” and that such kind of encampments will produce diseases in an army is well known. In the time of Dionysius, when the Carthaginian army under Imilco suffered so dreadfully, or rather was totally destroyed, his camp was situated on an eminence between two morasses, the heat at that time being excessive. Hannibal, the predecessor of Imilco, had also lost great part of his army by a plague, though he had been encamped in a healthy situation ; but, in order to raise a wall which should overlook the city, he had taken the materials of the tombs found in the common burial place, the city at that time containing two hundred thousand inhabitants. “ From the uncovering and disturbing of so many dead bodies (says our author) arose a terrible pestilence, which carried off immense numbers of the Carthaginians, and amongst the rest the general himself.” To the unhealthy situation of the armies also the Doctor ascribes the plague which took place in the Roman and Carthaginian camps in the time of the second punic war ; and the Carthaginians suffered most, by reason of their being nearer to the marshes. The state of mind, the cleanliness of the person, &c. also must be taken into account ; and our author shows that neither of these could be supposed favourable to the Carthaginians.

That personal cleanliness, and breathing pure air, should contribute to the health of individuals, or to any number of them collected into camps or cities, seems to be agreeable to reason and common sense ; nevertheless we find that this has been denied, and even Dr. Canestrinus says that “ in the plague of Lyons and Marseilles

“ it

* it was observed, that the most populous parts of these cities, *where the streets were narrow and filthy*, suffered less from the disease than those which were more airy and clean. At the time of the plague in London in the time of Charles II, the physicians advised that all the *privies* should be opened and exposed; the fetid odour from which having pervaded the city, the plague was stopped! Is it from this cause (the author asks) that the plague has seldomer visited Spain, the towns of which are intolerably offensive from their want of cleanliness?*

This certainly seems a very strange doctrine, nevertheless the fact that Spain is but little subject to the plague seems undeniable, and as it is no less certain that the towns are excessively filthy, it would seem that cleanliness is not effectual in preventing it. But, however agreeable the smell of human excrements may be to the Spaniards, or to the English physicians in former times, it seems to be less so at present. "I am persuaded" (says Dr. Ferriar) that mischief frequently arises from a practice common in narrow back streets of leaving the vaults of privies open. I have often observed that fevers prevail most in houses exposed to the effluvia of dunghills in such situations." In Spain the opinion seems to have been but lately eradicated; for some years ago, an order having been issued by government that the streets of Madrid should be kept somewhat cleaner, the people were so much exasperated at being threatened with the loss of the savoury odour, that a rebellion had almost ensued, and the physicians declared the smell of human excrements to be the most wholesome thing in the world.†

That

* Medical Review, vol, iii, p. 260.

† It seems, however, of late, that at least the city of Madrid is kept clean. Swinburne says, speaking of the palace at Madrid, "To the west it has the town, the three principal streets of which terminate in the Prado. These are three noble openings, excellently paved, and clean even to a nicety; indeed so are most of the streets of Madrid since the edict for paving and cleaning them." The foreigners that resided here before that time, shudder at the very recollection of its former filth. Some of the natives regret the old stinks and nastiness; as they pretend that the air of Madrid is so sub-

"til

* Dillon has a like remark in his "Travels through Spain."

That the confinement of human effluvia, along with heat and want of water, will produce a malignant fever, is certain from the example of the unfortunate people confined in the Black Hole at Calcutta. In this case the distemper seems to justify the opinion that plague may be artificially produced, perhaps more than any other upon record; for Dr. Ferriar informs us that it was attended with eruptions resembling those of the true plague. In this case, however, the confinement was beyond example in any situation which can be supposed incident to a city or camp. There is no country in the world where the inhabitants are equally numerous with those of the empire of China, its population at present being estimated by Sir George Staunton at *three hundred and thirty-three millions*, a number equal to *one third* of the supposed inhabitants of the whole globe; of consequence the cities must be immensely crowded with inhabitants; yet it remains free from plagues. Human effluvia therefore, in the most populous state in which mankind can exist in society, *are not* able to taint the atmosphere of a country or city. The following is Dr. Clark's account of that celebrated empire: "The whole empire of China is represented to be extremely delightful; the soil rich, the air pure, and the industry of the inhabitants astonishing. As it produces every luxury and necessary of life, it is justly esteemed one of the most fertile countries in the world. As the Chinese prohibit emigration, and seldom or never engage in war, their country is extremely populous. Every river maintains a proportion of inhabitants adequate to the land, whose families live continually in boats, without having any other place of residence. Their number of people lays them under the necessity

" till as to require a proper mixture of grosser effluvia, to prevent its pernicious effects upon the constitution. The extremes of cold and heat are astonishing in this place, and the winds so searching, that all the Spaniards wear leather under waistcoats, to preserve their chests; for they pervade every other kind of clothing."

The former filthiness of Madrid, together with its being situated in a climate exposed to the vicissitudes of extreme heat and cold, and its exemption from the plague under those circumstances, certainly presents a most solid objection to the theory of the domestic origin of plague. To the same purpose see below the remarks on the climate of China.

"sity of carrying industry to the greatest height; for
 "otherwise their country, fertile as it naturally is, would
 "be insufficient to maintain the inhabitants. Every
 "inch of land is cultivated; no forests nor woods, nor
 "even a single tree, is suffered to obstruct the labours
 "of the husbandman. Canals are cut every where to
 "water the fields, and marshes are manured for the
 "cultivation of rice. By these means health and plenty
 "are, in a great measure, the portion of its inhabitants
 "through all the seasons of the year. The only terrible
 "and fatal diseases to which they seem to be subject
 "are the small-pox and leprosy.

But, though our author determines in general that
 the air of China is pure, this cannot apply to every part
 of it without exception. On the contrary he describes
 in the following manner Wampoa, a village about four-
 teen or sixteen miles below the city of Canton, on Can-
 ton river: "It is the usual station of all European
 "ships in this river. On one side the land is low,
 "marshy, and covered with water, forming swamps fit
 "only for the cultivation of rice. The extent of these
 "swamps is considerable; the tide rises high, and over-
 "flows great part of them; but the intersection of the
 "rivers renders them more pure than they would other-
 "wise be, and consequently the air is much healthier
 "than one could expect from the unfavourable aspect."

In like manner Canton city he says "is built on a
 "very extensive plain, and is large and populous. Here
 "the government allow the English, Dutch, French,
 "Danes and Swedes separate factories on the banks
 "of the river. The city, though paved, is very wet in
 "rainy weather; and the water makes its way under
 "the factories of the different nations every tide. The
 "houses are built with bricks; the apartments are in
 "general small, and not very lofty, and the ground
 "stories are very damp. When the business of the sea-
 "son is over, the supercargoes remove to Macao, a
 "Portuguese island, subject to the Chinese government.
 "The city of Macao is situated on a rising ground;
 "the whole island is dry, rocky and barren; it is, how-

T t

" ever,

“ever, plentifully supplied with provisions by the Chinese; and, though the air is very sultry, yet it is tolerably healthy.”

From the preceding account it is plain, that the causes which operate in the production of plagues and epidemic diseases in other countries, though they exist in China, do not act there with equal efficacy. At Wampoa the marshes in the neighbourhood must, in the hot season, emit noxious effluvia as well as any where else, and there can be no certainty that the overflowing of the tide is sufficient to put a stop to their malignant influence. At Canton the water penetrates below the floors of the houses, and we have seen from Dr Fordyce* that *in other countries* the sprinkling of a floor with clean water, and the encampment of an army upon ground where water was found at a small depth below the surface, were sufficient to produce fevers; yet here it is not so. In this city also the inhabitants are numerous, and the apartments small; so that neither the perspiration of multitudes, nor the moist exhalations from water stagnating in the streets, nay, under the houses themselves, are able to produce the diseases in question. Again, at Macao the sultry heat of the air has as little effect as the rest.

Lastly, in Peking, the capital, the population and the crowd are immense. According to Sir George Staunton,† the city is about one third larger than London; but, as he supposes‡ it to contain three millions of inhabitants, the population must be twice and a third-part as great as that of London in proportion to its bulk. “The low houses of Peking (says he) seem scarcely sufficient for so vast a population; but very little room is occupied by a Chinese family, at least by the middling and lower classes of life. In their houses there are no superfluous apartments. A Chinese dwelling is generally surrounded by a wall six or seven feet high. Within this enclosure, a whole family of three generations, with all their respective wives and children, will frequently

* See p.p. 171, 172. † Authentic Account of an Embassy, &c, vol. ii. p. 34.

‡ Ib. p. 39.

“quently be found. One small room is made to serve
 “for the individuals of each branch of the family, sleep-
 “ing in different beds, divided only by mats hanging
 “from the ceiling. One common room is used for
 “eating.”

Where diseases are prevalent, circumstances of the kind just mentioned would certainly be urged as evident *causes* of them; but in China we see that *something* disarms such causes of their power. People, however, seldom want a salvo for any thing. “The crowds of people, at Peking (says our author) do not prevent it from being healthy. The Chinese indeed live much in the open air, increasing or diminishing the quantity of their apparel according to the weather. The atmosphere is dry, and does not engender putrid diseases; and excesses productive of them are seldom committed.” But, if the dry air at Peking contributes to the health of the people, why does not the moist air of Canton produce diseases? Besides, in this empire there are multitudes of people who live entirely upon the water, in a kind of houses constructed upon *junks*, employed in carrying grain from place to place, or for other purposes.* Sir George Staunton computes the number of inhabitants on a branch of a single river to be no less than an hundred thousand. What then must they be throughout the whole empire! Yet these people, though continually exposed to moisture, as well as to an almost inconceivably crowded situation, are yet no more subject to epidemics than others. Our author does not specify the *excesses* which produce disorders. Intemperance in drinking no doubt is one of them; but Dr. Patrick Russell expressly says, that he never saw an instance of the plague being brought on by intemperance.

Lastly, with regard to living in the open air, Mr. McLean has ascribed to the vicissitudes of this element the principal if not the *only* cause of epidemics. “A fact worthy of notice (says he) is, that aged persons and children are both seldomer and less severely attacked

* Authentic Account, &c. vol. i, p. 290.

“tacked by epidemics and pestilential disorders than
 “the young and middle aged, and women seldomer and
 “less severely than men. Now, if contagion was the
 “source of these diseases, the case would be exactly re-
 “versed. Old people, women and children, being more
 “in the way of contagion, would be more frequently
 “and more severely attacked. But the young and mid-
 “dle aged, being more exposed to the *vicissitudes of the*
 “*atmosphere*, the principal source of those diseases, they
 “are consequently more severely attacked. It has been
 “a puzzling question to solve why old people and chil-
 “dren are less exposed to plague, &c. but the solution
 “will be no longer difficult if it should be proved that
 “these diseases are *always* produced by certain states or
 “vicissitudes of the atmosphere, together with the appli-
 “cation of other powers co-operating in the production
 “of indirect debility.” In the country we speak of,
 however, this solution fails in a manner almost as evident
 as can be imagined. “The removal of the embassy,
 “(says Sir George Staunton) was a disappointment to
 “several persons belonging to it, who had made arrange-
 “ments for passing the winter at Peking. Judging of its
 “temperature by the latitude of the place, a few minutes
 “under 40° north, they were not aware of the violent
 “effect of the great range of high Tartarian mountains,
 “covered perpetually with snow, upon that capital,
 “where the average degree of the thermometer is under
 “twenty in the night during the winter months, and
 “even in the day time is considerably below the freezing
 “point. The usual inhabitants were guarded against
 “cold, not only by habit, but by an increase of clothing
 “in proportion to its intenseness, consisting of furs, wool-
 “len clothes and quilted cottons. They are not accus-
 “tomed to the presence of fire. They have no chim-
 “neys, except to kitchens in great hotels. Fires, on
 “which Englishmen chiefly depend against suffering by
 “the sharpness of the atmosphere, could not well answer
 “that purpose in houses which are so constructed as to
 “admit the external air almost on every side. Stoves
 “are, however, common in large buildings. These
 “stoves

“stoves are situated frequently under the platforms on
“which the inhabitants sit in the day time, and rest at
“night. The worst weather experienced in that capi-
“tal might be considered as mild by the Tartars, com-
“ing from a climate still more rude ; but other foreign-
“ers are said to feel themselves less comfortable at Pekin
“in the winter than in the summer, though the heat is
“then raised to the opposite extreme. In both they
“seem to require a seasoning. *Several individuals of the*
“*embassy fell ill during their stay ; and all did not recover.*
“The human frame seems calculated for the hottest
“rather than the coldest atmosphere, and to exist at
“the equator rather than the pole.”

Here we are involved in difficulties much greater than before. It appears that even the fine climate of China is healthful only to its own inhabitants. They can bear the *vicissitudes* of the air, which Europeans cannot. The prevention of plagues or mortal diseases then must consist in some mode of living by which people can accommodate themselves to the country which they inhabit, and without which every other precaution will be ineffectual. The diseases with which the attendants of the ambassador were seized could not be owing to any fœtulenness or dirtiness in their lodgings or food, or to want of apparel ; nor were they more exposed to the inclemencies of the air than others ; only they were in a strange country, where that inexplicable constitution of the elements acted upon them in a manner different from what it did on the natives, and, while it was friendly to the latter, proved pernicious to the former. But there was a time when even China was as unhealthy as other countries ; for the great plague in 1346 began in the northern part of it. We have seen, in a former section, that this was preceded by the most dreadful and violent wars throughout the whole Asiatic continent. Since the cessation of these violent wars the Chinese have staid at home, and applied themselves to the arts of peace, particularly to agriculture, which they have carried, we may say, to its utmost perfection. This seems therefore to be the true method of removing all those local causes
which

which produce epidemics, or at least of preventing them from doing hurt ; and, without attention to the natural duties and occupations of man, it is to be feared that all artificial modes of prevention will be found not only precarious but ineffectual.

Dr. Smith in the dissertation above mentioned observes, that "it may be doubted whether any *moral* cause would be sufficient to protect, for a long period, an unaccustomed resident in a marshy situation from the usual consequences." This is no doubt very probable ; but, from the example of Lord Macartney's attendants in China, it appears equally probable that it makes little difference whether the country be marshy or not. Dr. Lind has many excellent observations upon the subject of unhealthy countries, and gives particular directions for strangers how to act, when obliged to expose themselves to the inclemencies of the weather, but none of these being effectual in preventing the access of the true pestilence, we must still adhere to the old Latin adage already quoted, p. 302. Flight seems to be the most effectual method. To avoid migrations to those countries where it usually rages, and, if it were possible to persuade the inhabitants of such countries, to imitate the example of Chinese industry, instead of allowing the greater part of the territories they possess to lie waste, would in all probability gradually lessen both the frequency and violence of this terrible disease. Migrations of large bodies of people, especially for the purposes of war, are greatly to be dreaded. If a few Englishmen, possessed of every thing necessary, could not keep their health at Peking, what must have been the probable consequence of landing an army of an hundred thousand, with a view to conquest ? Or what could we expect if the Chinese were to "pour forth by millions" into other countries in order to conquer them ? Dr. Lind takes notice that even of the first Portuguese adventurers to Africa, such as escaped the first sickness continued afterwards to enjoy good health. He likewise observes that many who left Britain, after being seasoned to the countries to which they went, chose rather

rather to remain abroad for life, than to run a new risk by going back to their own country. It is not therefore so much the greater unhealthiness of the country to which we go, as the *change*, which is to be dreaded. If therefore great bodies of men will employ themselves in constant rambling from one country to another, no wonder that diseases break out among them, unknown, either in the countries they have left, or those to which they go.

We come now to the third mode of prevention, viz. that of destroying the infection after it has begun to exist. This is varied according to the nature of those things which we suppose to be infected. The general notion of infection taking place in the atmosphere has been already spoken of; but the uncertainty of this hypothesis, and the apparent impossibility of altering a constitution of the atmosphere, must certainly leave very little room for hope in this case. It hath, however, been attempted by various methods. Hippocrates adopted the opinion that *all* diseases were produced by the air, and from him it was borrowed by Lucretius as we are informed by the annotator on Creech's Translation of that author. "In his book *de Flatibus* (of "winds) says the annotator, after a long narration of "the effects that the air produces, he at length falls on "the subject of diseases, all of which he affirms to be "bred and generated in the bodies of animals by means "of the air. First (says he) I will begin with the most "common fevorous disease, which accompanies, in a "manner, all diseases whatever. For there are two sorts "of fevers: one that is promiscuous, and common to "all, and is called the *plague*; the other, by reason of "unhealthful diet, is peculiar only to such as use that "diet; but of both these kinds of fevers the air is the "sole author and cause, for the common fever or plague "happens alike to all, because they all breathe the same "air: and it is certain that the like air, being alike mingled in like bodies, must beget like fevers." In consequence of his theory, this great physician advised to have recourse to fire as a purifier of air in times of pestilence.

But

But experience doth not warrant the success of this method; neither indeed can we suppose that it could be successful, unless people were able to kindle such fires as would absorb the whole atmosphere of a country. This method was tried in London without the least success; nay, seemingly with bad effect; for, the very night the fires were lighted, more than four thousand people died; and, a few days after, an end was put to the experiment by such violent rains as extinguished all the fires at once.

The burning of infected clothes has already been taken notice of; but though this must certainly prevent any new infection from arising from *these* clothes, it will not prove that the infection may not evaporate during the time of burning, and, being volatilized even beyond its natural pitch, by the heat, may do mischief at a greater distance than could have happened had they been let alone. The instance, formerly quoted from Dr. Huxham, of the small-pox being disseminated by the smoke of burning infected clothes, if not a *proof*, affords at least a strong presumption, of the danger of such a practice. The only way of perfectly ensuring safety in such a case would be to burn them by the sea-side, when the wind blows from the shore. Were the smoke allowed to pass over land, and great piles burnt at once, it is impossible to say how far the contagion might be carried.*

Another mode of purification is by exposing suspected goods to heat, to the vapour of vinegar, &c. fumigating with gun-powder, sulphur, &c. and on this principle various powders of fumigation have been invented, some of which are said to have been very successful in Russia; and the composition of one is given by Dr. Alexander Russel in his Natural History of Aleppo; but all these are undervalued by Dr. Guthrie,† who calls the practice of fumigation or smoking, an “inadequate and ineffectual ceremony.” Dr. Mitchel, also discommends them, saying that they are advised “without any proof that these destroy pestilential matter, and while,

* In the time of the great fire at London, in 1666, ashes are said to have been carried to sixteen miles distance.

† Duncan's Med. Comment. vol. viii, p. 350.

" at the same time, it is certain that they diminish more
 " or less the wholesomeness of the atmosphere with
 " which they are mingled."* Of late the vapours of
 pure nitrous acid (the *nitric*, according to the new no-
 menclature) has been recommended, with the boldest
 appeal to experience ; but the consideration of this na-
 turally belongs to the second part of this work, where we
 shall have occasion also to consider the theory of the
 septic acid. In the mean time we must go on with some
 farther account of the different modes of fumigation.

" There is no better corrective (says Allen from Die-
 " merbroeck†) of a pestilential air, than fire ; as much
 " experience has taught us. Hippocrates subdued and
 " extinguished that famous plague, which came amongst
 " the Grecians from Ethiopia ; for he commanded great
 " fires to be kindled throughout the whole city, espe-
 " cially in the night time, to purge away the pollutions
 " of the air. It is believed that a fire made with juni-
 " per-wood or ash, tends much to correct the venomous
 " corruptions of the air. The kindling of sulphur and
 " gun-powder purify the air, and drive away its corrup-
 " tions ; so does the burning of amber, pitch, frankin-
 " cense, &c. so do the fumes of vinegar raised with red-
 " hot irons, or bricks." According to Etmuller, " Hip-
 " pocrates drove away *that famous plague* in Greece by
 " the use of sulphur ; the fumes of it are very much
 " commended to correct the air, and make drink more
 " wholesome ; it prevents all manner of corruptions and
 " alterations, as well as the putridinous alteration of the
 " blood. In a great degree of malignity, the shirt and
 " clothes may be impregnated with the fume of
 " sulphur."

Here we have accounts of a disease, called *that famous plague*, driven away by two different methods ; and, to complete our dilemma, Dr. Canestrinus tells us that the *plague at Athens* is said to have been staid " by sprinkling the streets with wine." What an expensive remedy, when the odour of *privies* was afterwards found to an-
 swer

* Med. Repos. vol. ii, p. 433.

† Synopsis, vol. i, p. 80.

swer as well ! “ Whilst the plague was raging at Ocza-
 “ kow, an *earthquake** happened on the very day that it
 “ began to decline. In this case did any vapour issue
 “ from the earth destructive of the pestilential conta-
 “ gion? or did former noxious exhalations cease in
 “ consequence of the convulsion of the earth ?† Sor-
 “ bait relates, that, in the time of the vintage in the
 “ neighbourhood of Moselle, the plague ceased like a
 “ miracle, while the must was in a fermenting state.
 “ At Vienna likewise it was observed that, during and
 “ at the close of the vintage, the disease manifestly de-
 “ clined ; which may have been owing to the great
 “ quantity of fixed air in the atmosphere.”

To this our author adds, that “ places adjoining to
 “ spice-shops have generally remained free from infec-
 “ tion ; and, in the plague of London, all those em-
 “ ployed in shipbuilding escaped the disease. Smiths
 “ also and cooks remained uninfected.” M. Volney
 tells us that, in Egypt, water-carriers are exempted ;
 and Baldwin, that oilmen are in the same happy pre-
 dicament ; while on the other hand Allen quotes Boer-
 haave saying, that “ Forestus, Diemerbroeck, the French,
 “ English, and Germans, observed, that all dealers in
 “ soap, washers, and all who by their business used soap,
 “ nay, *who only wore shirts washed with soap*, presently
 “ died of the plague.”

From so many and so discordant opinions, the only
 conclusion we can draw is, that, when once a pestilence
 has invaded a country, there is not any possibility of
 operating upon the contagion in such a manner as to
 destroy it. If the plague ceases, it must do so naturally,
 and

* Earthquakes, as we have already seen, might be accounted rather a *sign*
 or *cause* of the beginning of pestilence, than of its departure. A great quantity
 of electricity in the atmosphere has accordingly been enumerated among the
 signs of an approaching pestilence. Thus in Burnet's *Thesaurus*, p. 699, we
 find among the previous signs of a plague, “ plurima et fere continua nocturna
 fulgora, sine pluviis et tonitruis, cœlo non nubilofo existente.” Very much
 and almost continual lightning at night, without rain or thunder ; the sky in
 the mean time not being covered with clouds.

† Before we can attach any degree of probability to either of these suppo-
 sitions, it must be proved that plagues arise out of the earth. But this, though
 as plausible as many other hypotheses, is not yet supported by any direct
 proof.

and we *cannot* accelerate this cessation. This is entirely conformable to the opinion of Dr. Patrick Ruffel. Speaking of the decline of the plague at Marseilles, and the vigorous exertions of the magistrates to put a stop to it, he says, "The causes now enumerated might no doubt have some effect, but a more powerful and general cause had begun long before to restrain the havock of the pestilence, which had declined visibly in the month of September, and in those of October, November and December declined with a rapidity not ascribable to the exertions of the most vigorous police. This cause is generally supposed to be some change in the constitution of the air; but which has hitherto been defined with no better success than that peculiar state of the atmosphere which, in conjunction with contagion, is absolutely necessary to render the plague epidemical."

Dr. Ruffel takes notice of the methods of extinguishing contagion already mentioned, by kindling fires, &c. and disapproves of them. We shall not therefore spend more time in considering whether or not there is any probability of eradicating or mitigating the violence of a plague when once it is introduced. However this may be impracticable in so large a space, it seems that it certainly may be done in smaller spaces, ships for instance; or, if not with the true plague, at least with malignant and infectious fevers. Dr. Trotter, in his *Medicina Nautica*, has laid down methods for accomplishing this, and expresses the highest confidence in their success. He adopts the doctrine of *contagion*, of which he gives the same definition that in this treatise is given of *infection*, viz. "Something propagated from diseased bodies, or from substances that have been in contact with them, producing a similar disease in other persons"—the propagation of contagion, as well as its reception into the healthy body. A more aggravated degree of malignity will generate a greater quantity of infection, and, as it may be confined in a larger or smaller space, it will be less or more noxious. A fe-

" ver

* *Medicina Nautica*, p. 173, et seq.

“ ver may be called malignant, when, with the symptoms
 “ of debility, there is a cadaverous smell arising from the
 “ body, an unusual fœtor of the breath, stools, and other
 “ excretions, the tongue black and parched, the eye
 “ dusky or yellow, the countenance bloated and dejected,
 “ and the skin fallow. In approaching a sick bed of this
 “ kind, a person not much accustomed to such visits
 “ will be very liable to receive the infection; and the
 “ unpleasant smell will be much sooner perceived than
 “ by the physician or other attendants. We conclude
 “ that a malignant typhus is more apt to generate con-
 “ tagion, because slight cases are found not to extend
 “ to others, even though no mode of precaution has been
 “ used. The disease itself is incapable of generating in-
 “ fection, till after a certain period; but this period is
 “ uncertain: it seems to depend on the nature of the
 “ symptoms, whether they are mild or malignant. *We*
 “ *are assured of this fact, from a timely separation having*
 “ *prevented the farther progress; and by this means ALONE,*
 “ *I apprehend, we eradicate contagion in SHIPS, or ANY*
 “ *WHERE ELSE.* In the small-pox* the disease seems
 “ incapable of infecting another person before the second
 “ or third day of the eruption. With the measles it is
 “ otherwise. The disease may be propagated at the
 “ most early stage of the eruption; and, if I was to be al-
 “ lowed to conjecture on the subject, I would say, that
 “ the contagion is the offspring of the catarrh (the cough
 “ and hoarseness resembling a cold) which accompanies
 “ the measles.

“ Substances imbued with the exhalations from in-
 “ fected bodies, if not exposed to the air, have their pow-
 “ ers of communicating the disease increased; or, in
 “ other words, the infection from *fomites* (infected cotton,
 “ clothes, &c.) is said to become more virulent than it
 “ was when first separated from the body. “ I am

* In the plague, Dr. Russel has observed, that those who die in a very short
 time are much less ready to communicate infection, than those who live longer.
 He also takes notice, that “ the plague, though a contagious disease, is
 “ not equally contagious in every period of the pestilential season. In the
 “ beginning those frequenting the sick often escape unhurt, or one only, out
 “ of several, is infected. The escape of persons employed about the sick,
 “ proves a frequent cause of misleading the popular opinion of the disease, and
 “ has in many instances occasioned much mischief, by encouraging the neglect
 “ of due precautions till too late.”

“ I am of opinion, with others, that the exhalations or
“ excretions of the sick are the vehicles of contagion. It
“ is these which impregnate the atmosphere with nox-
“ ious matter : they affect in like manner bed-clothes, or
“ apparel, and every thing that can imbibe them, when
“ in contact with the diseased body. When bed-clothes,
“ or body-linen, but particularly silk or woollen cloth,
“ have been exposed to these exhalations, and then heap-
“ ed together for a length of time, the noxious efflu-
“ via are, as it were, multiplied, and will more certainly
“ infect others than they did at first. The bales of goods
“ which brought the plague to Marseilles, and affected
“ the people that opened them so suddenly, had their
“ virulence increased by not being duly ventilated.
“ When the jail-fever was brought into court by the
“ prisoners at Oxford assizes, and more lately at the
“ Old Bailey, the fever was propagated from the clothing
“ of the prisoners ; no doubt, from being confined in
“ impure, ill-aired cells, this infection became more vi-
“ rulent. The highly concentrated state of contagion,
“ in the bales of goods, could only have been brought
“ to that degree of virulence from the closeness of the
“ package : it cannot be supposed that human beings
“ could have put them together otherwise. The nurses
“ of hospitals know well, as Dr. Lind tells us, that there
“ is most danger of catching a fever when they pile
“ heaps of bed-clothes or body-linen together for a
“ few days, before it is carried to the wash-house. The
“ washer-women at Haslar have also told me the same
“ thing. They know when a dangerous fever is in the
“ hospital by the bad smell of the clothes : this makes
“ them air them abroad, till the smell is gone, and then
“ they can wash them with safety. But, if it happened,
“ from the hurry, that this could not be done, or if it
“ was neglected by design, many of them were seized
“ with the sickness. The porters and people employed
“ in cleaning and fumigating the blankets and beds at
“ Haslar are well acquainted with this fact, and they
“ measure the danger by the badness of the smell. This
“ ought to instruct every body to stand to windward of
these

“ these infected substances when they are opened ; as
 “ the current of air would then carry it the other way.
 “ In one of the courts of justice, the people who stood
 “ between the prisoners and a window, into which the
 “ wind blew, escaped the infection, while those on the
 “ other side were sufferers.

“ In the summer of 1793, while the *Orestes* brig, com-
 “ manded by Lord Augustus Fitzroy, lay at Plymouth,
 “ she was anchored very near and to leeward of an
 “ army transport, which had on board a very malignant
 “ fever among the soldiers. While the soldiers were
 “ moved on deck, to go on shore to the hospital, the
 “ crew of the *Orestes*, from curiosity, walked on deck to
 “ look at them. Such was the concentrated state of
 “ the contagion among the clothing and bedding of
 “ these troops, on bringing them from below, that
 “ eighteen people belonging to the brig were quickly
 “ seized with the same fever, the infection of which
 “ had been conveyed by the current of wind. It did
 “ not, however, extend much farther in the *Orestes*,
 “ from the attention of her commander. But this
 “ ought to be a caution for ships to keep clear of those
 “ that have fevers on board, as a *virulent* CONTAGION
 “ may be conveyed to a considerable distance.

“ Dr. Lind is inclined to think that washing the
 “ bed-linen in hot water, even when first shifted, is at-
 “ tended with much risk ; and that the noxious matter
 “ may be volatilized by the heat of the water, and affect
 “ the woman. For this purpose he has recourse to his
 “ favourite process, of *fumigation*, to insure the washer-
 “ woman. The heat of his fumigating furnace would
 “ no doubt dry the linen, and exhale any moisture ; but
 “ our practice in the *Charon* (the hospital ship) was, to
 “ plunge every thing as it came from the bed into a tub of
 “ hot water kept ready on purpose. The linen was wash-
 “ ed and dried immediately after. We had in that hos-
 “ pital many malignant cases of typhus, and some deaths,
 “ yet no infection was ever spread there.”

Our author next proceeds to inquire into the cause of
 this excessive concentration of the infectious matter in
fomites,

femites, or clothes, bed-clothes, bale-goods, &c. The most plausible reason, he says, that could for some time be assigned for this, "was, the generation of animalcula; "the cotton or woollen clothing was said to serve as a "nest for the corpuscles to multiply; and thus the contagion was thought to increase seven fold." This theory had an effect on the practice of physicians, both as to the prevention and cure of fevers supposed to proceed from thence. Our author looks upon the hypothesis to be chimerical, because none of these animalcules have ever been made visible by the best microscopes. But there is no necessity for supposing the animalcules to be invisible to the naked eye. They may creep on the ground, or fly in the air, without being observed by us. Mr. Baker's discovery of the insect which not only poisoned *eleven hundred thousand* times its bulk of water, but infected a much greater bulk of air, with its effluvia,* shows that such a thing may be *possible*; and in dubious matters bare possibility ought always to produce inquiry. If the perspiration of human bodies when confined becomes noxious, why may not that of a multitude of insects be so too? There is no necessity for supposing that an insect must be swallowed, or inhaled by the breath, before it can do hurt. What Dr. Trotter says of the variolous contagion emitted from the human body will apply equally to insects. "What has "been called the insensible perspiration (says he) which "arises from the surface and the lungs, we have a right "to believe carries with it in solution a portion of the "variolous matter which charges the atmosphere with "the contagion of small-pox, even in such quantities as "to impregnate the clothing of attendants and visitors; "by which means it has been frequently carried to families and villages many miles distant from its source." The smallness of size of insects can be little objection here. A skunk is but a small animal, yet it spreads its odour farther than an hundred diseased human bodies could propagate the plague.†

On

* P. 189.

† Here, I hope, it will not be thought unreasonable to digress a little in favour of the sensations of humanity, which on all occasions ought to predominate

On this subject, however, we may remark, that though the nurses and attendants on hospitals measure the degree of infection by the smell, yet people are by no means safe in approaching patients about whom no smell can be perceived. We have already seen, from Dr. Fordyce, that what may be called the *pure* infection of fevers is not perceptible by any of our senses; and there are examples of very offensive smells issuing from diseased bodies without any contagion ensuing. Dr. Trotter tells us, that "a patient in typhus was sent from the "Venerable to the hospital ship, with a foetor about him, that exceeded any thing of the kind that ever came within the Doctor's knowledge. After being washed and shifted, it still continued, and was perceived at a considerable distance. He died in a few days, yet nobody was infected from him, either in his own ship, or in our hospital. There was probably some peculiarity of constitution here." In M. Deidier's experiments, above related, the dog which eat the dressings of the plague sores, after being infected with the disease, emitted a very disagreeable odour, but we do not find that the odour was in any way infectious. In the Encycloped. Britan. art. Med. *Hydrophobia*, we find an account of an hydrophobic patient (and a patient who recovered) in whom the blood drawn from a vein was as black as ink, and stunk abominably, yet this stench was attended with no bad consequence. There is therefore no essential connexion between offensive smells and contagion; yet, as they are sometimes united, the absence of the smell ought not to encourage us rashly to go into suspicious places, neither ought the presence of it to deter us from venturing where we have otherwise good reason to do so. Having

minate in our minds. Birds are the natural enemies of that hateful class of beings we call *insects*, and which in general are the natural enemies of man. In proportion to the havoc we make among the former, the latter will multiply upon us whether we will or not. The wanton, indiscriminate, and I may add *provoking*, destruction exercised among this useful as well as beautiful and agreeable part of the creation, must certainly be sometimes attended with bad consequences. Though birds feed on many different kinds of insects, yet there are exceptions. If then we totally exterminate a species of birds, is it not probable that a species of insects might appear, the mischief done by which we could not be able to counteract? *Quere.* Is it not possible that the *Hessian fly* may have made its appearance from this cause?

Having given up the doctrine of animalcula, the Doctor goes on to explain the doctrine of concentrated contagion in a manner very similar to that given in this treatise, viz. from the decomposition of some kind of gas. "The fœtor of the breath (says he) perspirable matter, &c. evidently demonstrate that they differ from the healthy state. The smell, to our senses, comes very near what is called *sulphurated-hydrogenous gas*. Some of the fluids within the body would seem to be in some degree in a state of actual decomposition; unless we can suppose the mucous glands of the lungs secreting a fluid that taints the expired air in this manner. The decomposition of the fat, which sometimes disappears very suddenly in fevers, may give some ground for the supposition that a large portion of these exhalations are composed of hydrogenous gas. But, whether we can go thus far or not, what is separated from the body, it is plain, is more disposed to decomposition than when the body is in health. Now this process will still go on, whether exposed to the atmosphere or not, with this difference, that, by exposing substances which have imbibed the exhalations of the diseased to a free air, the noxious gases will be dissipated as quickly as they are evolved; while, on the other hand, by laying the clothes in a heap, packing them firm in a chest, or making up cloth into small bales, the gases are concentrated into a small space; and woe to the man who first inspires them. . . . Now this does not hold out an idea that the powers of contagion are multiplied, as by generation; for that would be to say, that these gases are *themselves* what we call the matter of infection. I would only go so far as to assert that they are the vehicles of it, till more certain experience shall determine farther."

With respect to fumigations with nitrous acid, our author repeatedly declares that he has no confidence in them; nay, he brings instances where they seemed to have bad effects. But as the dispute about fumigation has no connexion with the true plague, nitrous acid having never been used as a preventive for it, we shall defer any

farther consideration of it to the second part of this treatise, to which it naturally belongs.

We come now to the fourth and last mode of prevention, viz. a consideration of those means by which an individual, without separating himself from society, and who is daily obliged to have communication with the sick, may yet secure himself against infection. Here the means recommended are extremely various, and some of them so opposite, that we can scarce avoid suspecting them all. The misfortune is, that though a person should go, without fear, among the sick, though he should constantly take a medicine, and should never have the distemper, yet we cannot say whether the medicine did preserve him or not. Were it possible to know the particular constitution of the body which disposed some to resist the attack of the disease, attempts might be made to bring the constitutions of others to the same standard; but unfortunately our ignorance here is so great, that any attempt to alter the constitution of the body has generally proved unfortunate even in other diseases. Dr. Lind informs us, that the first Portuguese adventurers in Africa, having observed, that “such as had
“the good fortune to escape a fit of sickness or death,
“soon after their arrival, enjoyed afterwards a pretty
“good state of health, thence concluded, that the blood
“of such persons had been entirely changed by the diet
“of the country. Upon this erroneous principle they
“adopted a most fatal method of seasoning people to
“these unhealthy climates. They, by small quantities,
“frequently repeated, took away as much blood as they
“supposed to be contained in the body, and thus they
“reduced the patient to a state of extreme weakness.”

From its being observed that people of delicate constitutions are less liable to the plague than others, such a mistake probably has also been made with regard to this distemper, but with equally bad success. Allen tells us from Diemerbroeck, “*Phlebotomy*, though mightily cried up by many of the ancient and modern physicians, yet we reject it altogether, as *very dangerous and detrimental*; for it appeared by experience that
“those

“those who made use of it for prevention’s sake were
 “seized with the plague soon after bleeding, wherefore
 “we forbad it to all.” This may seem surprising, as we
 find bleeding so much recommended by Sydenham as
 a remedy ; but by others it is equally reprobated ; nay,
 Dr. Hodges tells us that he never knew but one who
 recovered from the disease after the use of it. Issues
 seem more likely, if not to prevent, at least to render the
 disease more mild if it should attack. They are recom-
 mended by Diemerbroeck, and Russel speaks of them as,
 “by some authors, represented as almost infallible.”
 He cannot, however, recommend them from his own
 experience, having never seen them opened for the pur-
 pose of preventing the plague ; and he justly observes,
 that when habitual on any other account, they may per-
 haps lose their effect in this. “Multitudes (says he) of
 “both sexes at Aleppo had issues in their arms, it being
 “there a very common remedy in a variety of chronic
 “disorders : but, notwithstanding those outlets, num-
 “bers perished ; and I did not remark that those who
 “had them were in any degree less liable than others to
 “be infected.”

Tobacco has been recommended as an excellent pre-
 servative, particularly by Diemerbroeck, who writes with
 a kind of enthusiasm in its favour. “Being called
 “(said he) to visit a patient afflicted with the plague, as
 “soon as I entered his chamber I felt a most offensive
 “smell of excrements (for he had a diarrhœa) with
 “which I was greatly affected. Leaving the house
 “after a very short visit, I instantly found myself seized
 “with giddiness, nausea, and uneasiness at the heart ; so
 “that I had no doubt of my having caught the pestilen-
 “tial contagion. Laying aside all business, therefore, I
 “immediately returned home, and smoked five or six
 “pipes of the best tobacco ; by the use of which all the
 “above-mentioned symptoms so totally vanished, that
 “I felt not the least uneasiness any more. Then, being
 “again desirous to go abroad and visit other sick peo-
 “ple, I took a drachm of theriaca, and from thence-
 “forward was in perfect health. The same thing hap-
 “pened

“pened to me three or four times during the time of
 “this pestilence; and without loss of time, according
 “to the quantity of infection I supposed that I had
 “taken in, I had recourse to the more plentiful use of
 “tobacco, by which my health was restored. I always
 “looked upon tobacco to be an excellent preventive
 “remedy, and its smoke I have sometimes found useful
 “to myself even in an incipient attack of the disease.”

He then proceeds to inform us of a report that in a violent plague at London all the dealers in tobacco were exempted. At Nimeguen, however, they were not so fortunate; yet of the family of the principal tobacco merchant (Thomas Peters, an Englishman) which was very large, none were infected, excepting only one servant maid, and she quickly recovered.

On this remedy Dr. Ruffel makes the same remark as on the issues. “The custom of smoking (says he) is
 “universal among both men and women at Aleppo.
 “This too, from its being habitually practised, might
 “perhaps lose part of its prophylactic virtue: at the
 “same time those who use it as a preservative must
 “always be supposed in some degree accustomed to it,
 “otherwise the violence of its operation on most persons,
 “on their first beginning to smoke, might prove
 “hurtful. It should further be observed, that the tobacco
 “commonly used in Syria is much milder than
 “the American, and that the oriental smokers seldom or
 “never spit.”

It hath been observed that the plague is stopped either by great heat or great cold, but more readily by the former than the latter. “It has generally been supposed
 “(says Dr. Canestrinus) that the cold of winter was
 “destructive of contagious matter; but various instances
 “of the contrary may be collected. The plague in
 “Transylvania continued through the very severe frost
 “in 1709. On the contrary it has been found, that
 “excessive heat has extinguished, or at least diminished,
 “pestilential diseases. During the plague at Aleppo
 “the weather was unusually hot in the beginning of
 “July,

“ July, and it was remarked that the disease declined considerably; and in general Dr. Ruffel observed, that the plague ceased at the hottest season of the year. The plague at Ockzacow, which raged in the years 1738 and 1739, began in the month of April, and continued with violence till July, when it declined considerably, and entirely ceased in the month of September; in February of the year following it re-appeared, and totally ceased in July.”

From these facts we might be led to suppose that a warm regimen, or occasionally exposing the body to great heat, might be advantageously used by way of prevention; but Dr. Ruffel justly observes, that the human frame, “ could it support such an application of fire and smoke as is necessary to expel or destroy contagion from infected substances, would probably receive little benefit from it, if infected; nor could those in health sustain, without prejudice, the heat and dense smoke which is probably required for the perfect extinction of the infectious effluvia floating in the confined atmosphere of a morbid body.” He is of opinion, however, that some kinds of fumigations may be of use, and he mentions some of these, but says that the perfumes ordered by the college are perhaps as proper as any, though their forms might be rendered more simple. Heat alone can scarce be thought very proper for prevention, and, when the disease is once begun, is said to be detrimental. Dr. Guthrie quotes Baron Ash saying, that “ in heated rooms the disease is ungovernable: it is only in free air that it is to be treated.” But of late a discovery has been made of a surprising power in heated oil of removing this disease, insomuch that, if we can believe what has been published of it, we must suppose it to be little less than a specific. So great indeed has been the confidence put in this method, that, by order of the Academy of Sciences at Lisbon, it has been translated into Arabic, French and Portuguese.* “ The method was first proposed by George Baldwin esq. agent for his Britannic Majesty, and consul-general at Alexandria.”

* Annals of Medicine for 1797, p. 373.

“ Alexandria. He communicated his method to Lewis
“ de Pavia, chaplain and agent to St. Anthony’s Hof-
“ pital at Smyrna; who, after five years experience,
“ pronounces it to be the most effectual remedy hitherto
“ made use of in the hospital of which he has had the
“ management for twenty-seven years. Immediately
“ after a person is perceived to be infected with the
“ plague, he must be taken into a close room; and, over
“ a brazier of hot coals, with a clean sponge, dipped in
“ warm olive oil, his body must be very briskly rubbed
“ all over; for the purpose of producing a profuse sweat.
“ During the friction, sugar and juniper berries must be
“ burned in the fire, which raise a dense and hot smoke,
“ that contributes to the effect. The friction ought
“ not to be continued more than four minutes, and a
“ pint of oil is enough to be used at each time. In ge-
“ neral the first rubbing is attended by a very copious
“ perspiration; but, should it fail of this effect, the ope-
“ ration may be repeated, first wiping the body with a
“ warm, dry cloth; and, in order to promote perspira-
“ tion still farther, the patient may take any warm su-
“ dorific drink, such as elder-flower water, tea, &c. It
“ is not necessary to touch the eyes; and other tender
“ parts of the body must be touched gently. Every
“ possible precaution must be made use of to prevent
“ the patient from taking cold, nor must the linen be
“ changed till the perspiration has entirely subsided.
“ The operation should be repeated once a day, until
“ evident symptoms of recovery begin to appear. If
“ there are already tumours on the body, they should be
“ gently and more frequently rubbed, till they appear
“ to be in a state of suppuration, when they may be
“ dressed with the usual plasters. The operation ought
“ to be begun on the first appearance of the symptoms
“ of disease; if neglected till the nerves and the mass
“ of blood are affected, or a diarrhœa has commenced,
“ little hopes can be entertained of a cure; but still
“ the patient should not be despaired of, as, by an as-
“ siduous application of the means proposed, some few
“ have recovered, even after diarrhœa had com-
“ menced.

"menced. During the first four or five days the pa-
 "tient must observe a very abstemious diet; the au-
 "thor allows only a small quantity of vermicelli, sim-
 "ply boiled in water. Nor must any thing be taken
 "for thirty or forty days, except very light food, as, he
 "says, an indigestion in any state of the disorder might
 "be dangerous. He does not allow the use of wine
 "till forty days. There is no instance of the person
 "rubbing a patient having taken the infection. He
 "should previously anoint himself all over with oil, and
 "must avoid receiving the infected person's breath into
 "his mouth or nostrils. The precaution to be used in
 "all circumstances is that of carefully anointing the
 "body, and living upon light and easily digestible food.
 "Mr. Baldwin observes, that among upwards of a
 "million of people carried off by the plague in Upper
 "and Lower Egypt, in the space of four years, he could
 "not discover a single oilman, or dealer in oil." *Lis-*
bon, July, 1797. By Royal Permission.

With regard to diet, and the use of spiritous liquors,
 opinions, as may well be imagined, have been very dis-
 cordant. Allen quotes Diemerbroeck advising *poor peo-*
ple to take two or three spoonfuls of the best white wine
 vinegar every morning, which he looked upon to be one
 of the best preservatives: he recommends also the fre-
 quent application to the nostrils of a sponge dipped in
treacle vinegar. With regard to himself he says that his
 principal care was to avoid uneasy passions of the mind;
 and that when he found himself any way disturbed by
 these, he cheered his heart by three or four glasses of
 wine: his common drink was beer, and also white wine,
 small, or moderately strong, which sometimes he drank
 to cheerfulness, but never to drunkenness. Dr. Patrick
 Ruffel also says, that "a glass of generous wine, or any
 "other cordial more agreeable to the choice, may be
 "taken before dinner, in case of languor, or oppression
 "at the stomach, from fatigue, sœtor, or apprehension.
 "I found a rummer of old hock very agreeable on such occa-
 "sions." Allen goes on to inform us from Diemerbroeck,
 that, "as to diet, it is adviseable in a pestilential dispo-
 "sition

“ fition to use temperance, which very much contributes
 “ to the preservation of health ; but all sudden changes
 “ are dangerous ; wherefore it is most dangerous sudden-
 “ ly to alter the usual rule of diet. It is very ill in the
 “ plague to go abroad with an empty stomach : hog’s
 “ flesh is looked upon to be very pernicious : all sweet
 “ things are to be avoided : wine moderately made use
 “ of is good, but the abuse of it very dangerous.—Mer-
 “ curialis testifies, that among the Patavians and Vene-
 “ tians, most of the tipplers died, who thought to drive
 “ out the plague with strong wines.” Mr. Howard in-
 forms us, that a person in high station at Constantinople,
 attributed his recovery entirely to the use of *green tea*,
 others to *brandy*. He also mentions a Mr. Hare, master
 of a merchant vessel at Senegal, who, during the preva-
 lence of a malignant fever there, was very much exposed
 to the infection, and who out of humanity waited upon
 a negro, whom nobody would go near. He took no
 medicines, neither did he taste either spiritous or ferment-
 ed liquors, and was the *only* European that entirely es-
 caped the contagion.*

These accounts seem to evince that little or nothing
 is to be expected from a change of diet. This is an at-
 tempt to change the constitution of the body, and can-
 not be expected to succeed any more than bleeding.
 There is a certain quantity, and a certain species, both
 of food and drink, different in different persons, necessary
 to preserve health, and those who require both in larger
 quantity or better quality than others, are no more to be
 charged with intemperance than those who are support-
 ed by the smallest quantity of the coarsest fare. In
 times of danger, therefore, those who have been accu-
 tomed to spiritous liquors ought not to give them over ;
 neither ought those to begin the use of them who have
 not used them before. From the account formerly
 given of the structure of the human body, it appears to
 be furnished with an apparatus for *exhaling* or throwing
 out a perspirable matter as well as for *inhaling* or taking
 in

* The opinion of those physicians whom Mr. Howard consulted upon this
 subject are given at large in the APPENDIX.

in one equally subtle. How far the skin may be able to *inhale* or rather *imbibe* surrounding effluvia, may be doubted; but with the lungs there cannot be any doubt; and the effluvia taken into them must unquestionably affect the blood, and of consequence the vital principle, almost without any medium. To deprive the body of its due portion of nourishment therefore is to *throw a temptation in its way* (if I may use the expression) to absorb *any thing*; and the same effect must ensue from any other mode of debilitating it, either by intemperance, terror, or the like; and hence to visit infected places while under any such debility must be very imprudent. Dr. Russel agrees that it is a general and rational precept, never to go abroad fasting. For those who cannot easily bear fatigue without eating between breakfast and dinner, some light food may be proper, at an intermediate hour, in order to avoid going into the chambers of the sick with an empty stomach in the forenoon. "In such circumstances (says he) after a long and "fatiguing morning, I have often found myself disagree- "ably affected in my latter visits, and have been sensi- "ble of slight giddiness, and of the appetite flagging at "dinner, as if something lay on the stomach. I have "known others much more strongly affected in this "manner, and consequently much more alarmed. In "such cases much no doubt may depend on the fancy; "but in those times the power of the imagination "requires management. So intimately is it connected "with the accidental state of the body, that the same "risk, from which a man shrinks in a state of languor "and fatigue, he will encounter undauntedly after a "temperate meal: the strange, unusual sensations, which "amount almost to a persuasion of having caught the "infection, will often, like the phantoms of a vision, "vanish after a few glasses of wine.* Whether any "flight

* This doctrine of fancy, or imagination, ought undoubtedly, as Dr. Russel says of the imagination itself, to be under some management. The indiscriminate use of the word has been carried to such a length as in a manner to supersede all evidence, testimony, argumentation or reason. With some it is sufficient to discredit the most positive testimony, (even upon oath) if they take

“ slight degree of real infection can be thus dissipated,
 “ I shall not take upon me to determine ; is is sufficient
 “ for the present purpose to indicate the means of re-
 “ straining those alarming sensations which, when aggra-
 “ vated by imagination, are apt to depress the spirits,
 “ and, according to the general opinion, to reduce the
 “ human body to that *relaxed, inhaling* state peculiarly
 “ susceptible of contagion.”

As to other modes of precaution, the Doctor advises that such as are about the sick “ should guard the mouth
 “ and nostrils with vinegar, avoid drawing in the breath
 “ while close to the bed side, or swallowing their spittle
 “ while in the infected chamber. Before they approach
 “ the bed in order to examine the eruptions, the bed-
 “ clothes ought to be removed, to give time for the
 “ dispersion of a confined steam which immediately dis-
 “ covers itself to the senses ; and it will be advisable
 “ to dip the hands in vinegar before examining the
 “ parts. On coming out of the chamber it will also
 “ be proper to rinse the mouth, and wash the hands,
 “ with vinegar, plain or camphorated.” He advises also
 to

take it into their heads that such a thing *cannot be* ; which by the bye is as strong an evidence of *ignorance* as any man can give. If imagination is given as a *cause*, the extent and nature of its powers ought to be ascertained ; but who has done this ? On the contrary I may say that not one in five hundred who makes use of the word would be able to define it. But the most curious mode of reasoning used by these *imaginary* gentlemen is, if they are asked, “ How do you prove that such a thing is the effect of imagination ? ” they are ready to answer, “ I can indeed bring no proof that it is so, but how do you prove that it is not ? ” Here the *imaginaries* have not *reason* sufficient to show them that *they* ought to bring a proof, and not those who say they saw or felt any thing. But, waving this, *sense* is the highest faculty in our nature ; *imagination* as well as *reason* are inferior to it ; because neither the one nor the other can be conversant except about the objects of sense. If any person therefore says that he *sees* or that he *feels* any thing, nobody can, with any shadow of reason, say that he neither *saw* nor *felt* any thing. If one man sees what another cannot see, while the supposed object is easily within reach of the eyes of either, then the one who cannot see it has a right to suspect that the object is imaginary ; but, if the person himself feels any slight pain or uneasiness, and that should go off in a short time, after drinking a glass of wine, there is as little reason to suppose that the pain was imaginary, as that the drinking of the wine was imaginary. In Dr. Russell's case, though his strength was in general sufficient to resist the contagion in which he was immersed, yet, when that strength began to decay, it was no wonder that he found the contagion beginning to invade : a few glasses of wine gave vigour to the system, and enabled it to repel the attack. Had he been much fatigued with bodily labour, and found himself greatly relieved by a few glasses of wine, surely he would not suppose that his former fatigue was merely imaginary. Just so must it be in the former case ; the one has no more to do with imagination than the other.

to fumigate the clothes with nitre, sulphur, and juniper berries, burnt on a red-hot iron.

“ Upon returning home it may be advisable to shift
“ clothes immediately, hanging those taken off upon
“ lines in a small chamber, to be again smoked, and af-
“ terwards aired. The mouth and hands ought once
“ more to be well washed, and the hair might be fumi-
“ gated with a little nitre and sulphur, by means of a
“ pipe, so as not to incommode the lungs.

One other mode of prevention, not of the disease, but of incurring danger from it, is inoculation. This is greatly recommended by Baron Ash above mentioned, and not only for the plague among the human species, but for that among cattle, which frequently destroys great numbers of those necessary animals. The case of Mathias Degio related p. 272, shows the practicability and the safety of it. The only solid objection that can be made to it is, that those who have once had the plague are not secure from having it a second time, or oftener. Yet, if we consider the extreme fatality of the disease when it attacks in the natural way, and that the number of those who have the plague only once is much greater than of those who relapse, this practice will certainly be found to merit consideration, and, unless some objection to it be discovered greater than any that has yet appeared, seems likely to be advantageous to the human race in general.

SECTION V.

Of the Cure of the Plague.

FROM what has already been laid down in a former section concerning the nature of this distemper, it appears, in its worst and most deadly form, to consist in the sudden breaking forth of a kind of hard mortifications, or rather eschars, like those made by fire, in different parts of the body. When these happen to fall
upon

upon any of the vital parts, it is evident that no cure can be applied. When such eschars discover themselves in abundance on the external parts, it is likewise observed that the patient certainly dies ; whether from the same taking place inwardly, or from nature not being able to bear the loss of substance, and to separate so many deep eschars, is uncertain : but this kind, which attacks without fever, has always been reckoned absolutely incurable. When the tendency to internal mortification is less, and the fiery blasts, if we may so call them, approach the surface, so that buboes or carbuncles begin to appear, there is then some hope that the patient may recover. Even here, however, the case must be considered as very doubtful, and we have seen that in Dr. Ruffel's three first classes of patients not one recovered ; nevertheless, as we are not always able to distinguish with certainty whether the patient is altogether beyond the power of medicine or not, excepting where the *tokens* formerly mentioned appear, this kind only is here distinguished by the name of the *fatal* or inevitably mortal kind of plague. In all cases, where there is time allowed, medicine ought to be employed ; but, as in other diseases, different theories have bred such a contradiction of opinions, that it is with no small difficulty we can judge which has any *probability* of success. In this uncertainty, however, we must look upon those who have recently had an opportunity of seeing the disease as superior not only to those who have only *read* of it, but even to the most celebrated ancient physicians who have written upon the subject. Those who have had the best and latest opportunities of seeing the distemper are Drs. Alexander and Patrick Ruffel at Aleppo, and the physicians to the Russian army when the plague raged in it in 1770, &c.

Dr. Alexander Ruffel begins with observing that
 “ the discordant opinions of medical writers concerning
 “ the method of treating the plague are innumerable.
 “ In regard to bleeding and other evacuations, they
 “ maintain opinions diametrically opposite ; some recom-
 “ mending them as indispensably requisite, others decry-
 “ ing

ing them as invariably pernicious ; while both parties, with equal confidence, appeal to experience. But, in a disease wherein reason is often perplexed, and experience itself fallacious, it is greatly to be lamented that nature is not more, and opinion less, consulted.

No traces of any satisfactory method of cure are to be met with among the natives at Aleppo. The Mahomedans, holding the plague to be a penal curse inflicted by Almighty God on a sinful people, have less faith in the efficacy of medicine in that disease than any other ; and, as the chief of those who practise physic are either Christians or Jews, not armed with the doctrine of predestination, and consequently apprehensive of contracting the infection, they (the physicians) endeavour to confirm the vulgar notion of the inutilty of their art in the plague, with a prudential view of evading the danger of being forced to visit the sick. Hence the greatest part of the infected are either left to struggle with the disease without any assistance from medicine, or are under the necessity of submitting to the direction of the meanest and most ignorant of mankind."

The whole practice of the native physicians consists in bleeding, let the stage of the distemper be what it will, and afterwards attempting to raise a sweat with the insignificant remedy of a few grains of bezoar mixed with the distilled water of scorzonera. On the subject of evacuations our author remarks, that bleeding, even very plentifully, was always useful in the beginning, but as constantly prejudicial after the first day. Vomiting was equally useful at the same period ; with mere warm water, if that would answer the purpose, but if not, small drops of ipecucuanha or sal vitrioli might be added. Violent cathartics were hurtful, but an emollient clyster or laxative of manna and cream of tartar were not only safe but serviceable. "On the second day of the disease (says the Doctor) where the remissions of the symptoms were tolerably distinct, I have frequently and successfully given an infusion of fenna with manna and cream of tartar ; and it is a fact confirmed to

" me

“ me by repeated experience, that a purgative of this
 “ lenient kind, given after the critical sweat, was the
 “ most effectual means of promoting the suppuration of
 “ the buboes.

“ The natural crisis of the disease was always by the
 “ skin. When a copious sweat could be procured by
 “ art, it was likewise of service ; but the attempt, if
 “ made the first day, was attended with two material
 “ inconveniences : the first, that the common diapho-
 “ retic medicines, if given in the usual dose, if they
 “ failed in their operation, threw the patient into a
 “ flame, and greatly augmented all their symptoms ;
 “ the second, that, though they produced the desired
 “ effect, it was necessary to keep up the sweat a much
 “ longer time than most people of that country could
 “ be persuaded to endure ; and, if the sweat was prema-
 “ turely checked by exposure to the air, all the symptoms
 “ were either exasperated, or (what was often the case)
 “ a diarrhœa was induced, which, though at first it might
 “ seem to relieve, yet generally proved fatal in the
 “ end.”

Contrayerva and valerian, saffron, the compound
 powder of contrayerva of the Edinburgh College, are
 recommended as sudorifics ; given in small doses every
 four hours, with acidulated diluent drinks. These me-
 dicines were occasionally joined with anodynes, among
 which syrup of poppies was reckoned preferable to opi-
 um. In cases of diarrhœa, Venice treacle or diascor-
 dium were joined with the diaphoretics. Neither bark
 nor snakeroot could have a fair trial, on account of the
 prejudices of the people : and on this occasion our au-
 thor observes, that “ the physician who would obtain a
 “ ready compliance with his directions, in that country,
 “ must as seldom as possible offend the palates of his
 “ patients with nauseous remedies ; for, whatever may
 “ be the consequence, they will often rather choose to
 “ incur distant though great risks, than avoid them by
 “ submitting to present inconveniences.” Nitrous me-
 dicines were found ineligible on various accounts :
 1. They did not, as in other diseases, allay heat. 2. The
 sick

sick could not bear them in ordinary doses without languor and dejection. 3. They were apt to bring on a diarrhœa.—The following is an epitome of our author's practice :

1. Bleeding from ten to twenty ounces as soon as possible after the seizure. The quantity seldom exceeded sixteen ounces, and even this is greatly above what is taken in any other disease in that country.

2. After bleeding, where the nausea was considerable, the stomach was cleansed with warm water ; or, if that failed, with ipecucuanha or salt of vitriol. It was of such importance to have both these evacuations performed early, that our author instructed most of his acquaintance how to act if they should be infected.

3. A gentle anodyne succeeded the vomit. If by it the stomach was not quieted, an ounce of diascordium, or 15 drops of laudanum, were added to the saline draught of Riverius.

4. Small doses of cordial and diaphoretic medicines, with a very small quantity of antimoniated nitre, were exhibited every four hours ; the sick were encouraged to drink freely of a decoction of scorzonera roots and barley, or spring water moderately acidulated with spirit of vitriol. A mixture of the acid with syrup of violets was kept ready to be added to plain water. All the drink was given warm if the patient would be prevailed upon to take it so.

5. In the winter the sick were removed into more airy lodgings than those in which they usually slept, and the air of the room was warmed or corrected by a moderate fire. In summer only the windows opposite to the patient's bed were ordered to be shut ; but even this restriction was not universally complied with ; many insisting upon setting all the windows open in the day time, and sleeping on the house top at night.

6. In case of faintness and uneasiness, a cordial, composed of some of the simple distilled waters, tinctures of saffron and valerian, alkermes, and spirit of vitriol, was used with advantage and great refreshment to the sick. This with plenty of acidulated drinks was the chief prescription for infected children.

Under

Under the above treatment, a sweat often broke out on the second or beginning of the third day ; after which the sick were covered up, and the sweat encouraged as long as they could be persuaded to bear it. By this first sweat, especially if it happened on the second day, the patient was never freed from the fever, though greatly relieved. It was therefore necessary to continue the same medicines, in order, by a more plentiful sweat, to procure a perfect crisis. Where the sweat was supposed to be sufficiently copious, and had greatly mitigated the symptoms, a mild cathartic was given in the morning, though some degree of fever still remained ; the other medicines not being intermitted during its operation. An anodyne was given in the evening.

In case of an exacerbation of the symptoms or the depression of the buboes, as sometimes happened on the second or third day, it was useful to apply a blister just below the tumour. A blister to the head was useful in cases of coma and debility of the tongue. The natives were exceedingly averse to the use of blisters ; but, having observed that some who had been judged past recovery had nevertheless struggled through, apparently from the use of blisters, they at last came into some degree of credit. Cataplasms, composed of garlic, bread and vinegar, were advantageously applied to the soles of the feet. These, as well as blisters, were useful in cases of coma ; also emollient laxative clysters. The dose of the alexipharmics was increased, and acidulated drinks, in small quantities at a time, given frequently.

To the buboes it was customary to apply suppurative cataplasms ; but, as these could not, where the patient was desirous of walking, be easily kept on, a diachylon gum plaster was substituted, with the addition of a few cantharides, or a little euphorbium, if a greater stimulus was judged necessary. In most cases the buboes were left to open of themselves ; the natives being afraid of the lancet or caustic, and sometimes operators being wanting. No bad consequence ensued on their being left to open of themselves, nor was any particular treatment necessary. Where they mortified, the treatment

was the same as in carbuncles, and though, after the separation of the gangrened parts, the ulcer often remained wide and deep, yet they healed kindly and in a short time.

Sometimes the carbuncles were scarified, but oftener not. The best dressings were pledgits of yellow basilicon, with a small proportion of oil of turpentine, or sometimes tincture of myrrh, with an emollient cataplasm over all.

Dr. Patrick Ruffel complains that, in Turkey, physicians are laid under such restraints, by popular prejudices, that they are sometimes obliged to remain almost passive spectators of the disease. The natives are fond of bleeding, and will at any time let blood in the hot stages, when the febrile symptoms run high. About two thirds of the infected were bled at the arm; but from the rapid progress of the disease, and the quick transition to the low, languid state, few were bled more than once, and that usually within the first forty hours. The time of bleeding was usually the first night, or some time on the second day; but sometimes not till the third. Where the operation was repeated, it was usually on the third, sometimes on the fifth, and even on the sixth; he has even met with instances wherein the patient was three or four times bled, the last being as late as the seventh day. In his own practice he usually advised one bleeding at the beginning, except in the very young, aged, or infirm. On the first day, if not forbid by circumstances, bleeding was ordered by way of precaution; but on the succeeding days it was regulated by the state of the pulse, and other symptoms. Where the infection was slight, and the febrile symptoms moderate, or did not come on till some days after the eruptions, it was wholly omitted. The quantity of blood taken away seldom exceeded eight or ten ounces. Cupping was used by the natives, but never ordered by Dr. Ruffel. Children were scarified in the legs. He seldom had an opportunity of examining the blood drawn from a vein; but, in such cases as occurred, the general appearance was little different from that of healthy blood; the crassamentum

was sometimes of a darkish colour, but never fizy or resolved.

With regard to the propriety or impropriety of bleeding, or at least the success attending it, we can best judge from the histories of cases given by Dr. Ruffel at the end of his work. Of these there are an hundred and twenty, with some supernumeraries, giving an account of the cases of the attendants, &c. Of these, sixty-five were bled; forty died, and twenty-five recovered.

Of these hundred and twenty cases at large, fifty-seven recovered, as many died, and the event of six was unknown. This would tend to give us some considerable idea of the Doctor's success; but, when we take into account the time of the year in which these cases were treated, the matter will appear in a quite different light. Twenty-seven took place mostly in the earlier part of the season, and were of consequence more violent than the others; and, of these, twenty-one died, five recovered, and the event of the other case was uncertain. Of the rest only thirty-six died, and fifty-four recovered. Such an excessive disproportion cannot be ascribed to the medical treatment, but to the nature of the disease itself, growing milder as it extended wider. In many of these cases it is not mentioned whether the patients took any medicines or not; nevertheless, as it must always be supposed that a physician would prescribe something for his patient, it must also be supposed that all took medicines, excepting where we are expressly told that they did not. The cases in which he mentions the medicines employed were the following:

1. A young man of 20, suddenly seized, was bled largely; had a vomit of ipecacuanha, which brought off a quantity of bile, but without putting a stop to the natural retchings. Some diaphoretic medicines were given, which did not remain on his stomach, and he did not sweat. These were stopped by a draught of juice of lemons and alkaline salt taken in the act of effervescence. Sinapisms were applied to the feet, and he died the third night at midnight.

2. A widow lady about 40, of a thin, delicate habit, in whom the disease came on gradually, was bled on the third day, and took diaphoretic medicines and acidulated cordials till the 9th. She died on the 11th.

3. A Jewish rabbi, between 30 and 40, of a thin, spare habit, was bled on the 2d day, and died early on the morning of the 4th.

4. A Jewish boy, between seven and eight years old, of a pale, unhealthy complexion, was repeatedly purged, and had suppurative cataplasms applied to the buboes without effect. He recovered slowly. Dr. Russel was not called till the seventh day of the disease, and we are not informed when the purgatives were administered.

5. A Jewish lad of 14, healthy and florid, was visited on the third day. He had already been scarified in the legs, and bleeding was ordered; but, as he became faint, only a small tea-cupful could be taken away. The blood, after two hours, was found to have a soft and loose texture, somewhat blackish on the surface; but the quantity of serum was not greater than usual. It had appeared of a blackish colour at first. He had a vomit, draughts with spiritus mindereri; afterwards a diaphoretic mixture and acidulated cordial, and sinapisms to the feet. On the seventh day he sweated copiously, and was much relieved, but soon relapsed. On the 10th he sweated early in the morning, and had a temporary relief, but soon became worse than ever. On the eleventh he had three stools of black blood. One of these, kept for the Doctor's inspection, consisted of about three tea-cupfuls, without any fæcor; the others were "inconsiderably small." Some tincture of bark was now added to his usual mixture. On the 15th he had a purging potion which operated five times, had an opiate at night, and tincture of bark with elixir of vitriol was ordered twice a day. Next day he was quite free of fever, and quickly recovered.

6. A Jew of a thin, spare habit, who took no medicines, died on the sixth day. His wife, of a delicate frame, and six months gone with child, was bled in the arm, had "proper drinks" directed for her, brought forth

forth a child in the agonies of death, and expired on the sixth day. They were extremely poor, and Dr. Ruffel says of the house they inhabited, that it "was one of those miserable dwellings which he had always considered as one of the receptacles of contagion." It did not, however, appear to be so; for, though there were other six in the family, only one of them was infected, who died in ten days.

7. A youth of a delicate constitution, a French native of Aleppo, was visited on the morning of the third day. He had a carbuncle on his neck, which had been mistaken for an ordinary inflammation, and a physician who had previously visited him applied a galbanum plaster, ordering also some nitrous medicines; but the plaster giving much pain, it was changed for a common poultice. Live pigeons were applied to the feet. On the fourth he had a diaphoretic medicine, and his drinks were acidulated with spirit of vitriol. The symptoms increasing, sinapisms were applied to the feet, but without effect. Cataplasms of garlic were applied next night; he had two copious black stools, not very foetid, and two bilious ones in the morning of the sixth. By these stools he was greatly weakened, and was ordered a cordial with diascordium. He had another stool, and became much worse. Cataplasms were applied without effect, and he died on the seventh day. This patient had a great number of eruptions; but, though six people attended him constantly, none of them were infected.

8. A Jewish girl of nine years old, of a delicate frame, and sprightly disposition, was visited on the 4th day. The usual regimen and medicines were ordered, but she could not be prevailed on to take any thing besides an acidulated cordial. Palm-oil was externally applied to a carbuncle near the corner of the mouth, about an inch long, and the third of an inch broad. This seemed to ease the pain, but did not prevent it from spreading. The face was also strangely disfigured by three or four streaks of a pale red colour, shooting up on each side from the cheeks towards the temples. The gangrene spread

spread rapidly, and she died on the evening of the tenth day.

9. A stout, healthy Armenian youth, about 20, was visited on the first day, and took a vomit of ipecacuanha, which brought up a good deal of bile. An anodyne was given at night, but without effect. He took no medicines afterwards but an acidulated cordial. On the third he eat a quantity of cherries, and drank some iced water. He died on the fourth. Here the infection spread violently, only one out of six in the same house escaping the disease. Three died.

10. An Armenian woman in the seventh month of her pregnancy. She was bled the first day, had afterwards diaphoretic boluses, but did not sweat. On the third day she was delivered of a dead child, and seemed much better, but died at night. After death the body was entirely covered with purple marks.

11. A boy was bled and had an alexipharmic mixture the first day. A diarrhœa came on, and diascordium was added to the mixture without success. He died the third night. The infection was violent, only one in the house escaping.

12. A Jew of middle age and gross habit of body was bled on the second day. He was visited on the fifth, had diaphoretic powders, and sinapisms were ordered without success. He died on the 6th.

13. A Christian youth of 17, taken suddenly, was visited on the second day. A cataplasm was applied to the groin; he had a vomit of ipecacuan, and a diaphoretic draught with nitre and diascordium at night, but did not sweat. Next day he had acidulated drinks, a mixture with sweet spirit of nitre, and a small proportion of nitre itself. On the fourth, he had two stools, of a reddish colour like blood, after which he became much worse. In the night he had two other stools, which seemed to lower him. Throughout the day a larger portion of nitre had been added to his mixture, and three tea-cupfuls of blood were taken away, without the Doctor's knowledge, by cupping. On the fifth the nitre was omitted; he was ordered an astringent cordial,

dial, but it was not given ; however, the diaphoretic medicines were continued, and he had three loose stools, which sunk him greatly. Next day he seemed past recovery ; lying motionless, insensible, his breathing quick, laborious and interrupted ; the skin not cold, but the feverish heat gone, and his countenance ghastly. From this lethargic state the women attempted frequently to rouse him, by applying vinegar to his nostrils, calling him loudly by his name, and such like means, by which they sometimes succeeded ; but, though he opened his eyes, and gave signs of sense, he could not be prevailed on to drink ; and he remained silent. He would then, for some time, writhe his body as in mortal agony, and again relapse into lethargy. This dreadful paroxysm, however, began to wear off about noon ; and at night he was less disturbed than usual. On the seventh day he was manifestly better ; he had a looseness, with gripes, for which the white decoction was ordered ; and he had tincture of bark thrice in twenty-four hours. On the sixteenth day the fever was entirely gone. The Doctor observes that this patient sweated much less than was usual with those who recovered.

14. A Christian boy about 17 was visited on the 4th day, having taken some absorbent powders on the 2d from another physician. The family would allow no other medicines to be given, except a few grains of bezoar, and he died next day.

15. An Italian, a man about 40, of a gross habit of body, and addicted to drinking, but who, finding himself somewhat indisposed, had for two or three days lived temperately, was visited on the second day of his illness, had a diaphoretic mixture, and a laxative medicine, without relief. In the night between the 5th and 6th he had some retchings to vomit. Next day he complained of a pain at the pit of the stomach, had a vomit of ipecacuanha, which brought off a considerable quantity of bile by vomit and stool, but without any apparent relief. He had two foetid stools, and was ordered a cordial with volatiles. On the 7th his pulse was exceedingly sunk, and his extremities had been as cold as ice, but

but with very little alteration in the eyes or countenance. The patient did not know that these parts had lost their heat; and, notwithstanding this change, the sensation still remained in them. He died on the afternoon of the 8th day. This patient had no eruptions.

16. A Christian merchant about 50, of an atrabilious habit, and subject to the hæmorrhoids, on being taken ill drank immoderately of cold water. He was visited next day. In the afternoon about ten ounces of blood were taken away, and, as his pulse rose after the operation, he lost, by Dr. Ruffel's order, six ounces more. Three ounces were afterwards taken away by cupping, and about as much more was accidentally lost by the loosening of the bandage of the arm; so that about 24 ounces were taken away in all. Next day he got a few drops of Carmelite water, a kind of spiritous cordial, which he vomited, had a blister and sinapisms applied, and died between 10 and 11 at night. He had no eruptions.

17. An Armenian youth was visited on the morning of the third day, was bled, and had a saline draught every four or five hours. On the fifth he was removed into a more airy chamber, and had Huxham's tincture of the bark. He died on the ninth day.

18. A young lady of French extraction, of a thin, slender make, was visited on the morning of the second day. On the third she had diaphoretic powders, and lost a few ounces of blood by cupping, without the Doctor's knowledge; she had a diaphoretic mixture, and died on the sixth day.

From these accounts it is easy to see, that, in violent cases of the plague, medicine can do little or nothing. Such cases generally occur in the earlier months of the season, though they may take place, and do take place in great numbers, at any time. In the beginning of the season the patients are almost all attacked in this violent manner, and very seldom recover, whether they take medicines or not. It being then an established fact, that as the epidemic season advances the disease grows milder, and many more continue to recover of themselves.

themselves than did so at first, we are naturally^l led to suppose that a multitude of those who recovered after taking the medicines would have done the same without them. Little therefore needs be said of the immense number of prescriptions found in authors who have written upon the plague, as it may generally be supposed that at certain times these would have been ineffectual, and at others they were useless.—The following is an epitome of Dr. Patrick Ruffel's practice :

1. Bleeding as early as possible, seldom repeated, except where manifestly indicated by circumstances.

2. Vomiting, if spontaneous, was encouraged by warm water. If the patient was affected by nausea, vomiting was provoked by warm water or camomile tea, assisted by a feather. If a bitter taste in the mouth was complained of, ten or fifteen grains of ipecacuanha were given. The times of remission were laid hold of for those remedies.

3. Where spontaneous vomiting continued too long, a saline mixture was given, sometimes with opiates and external applications.

4. The stomach being settled, mild sudorifics were given in small doses, every five or six hours. In the beginning, nitre was joined with contrayerva, but where it occasioned loose stools, was left off. Spiritus mindereri and saline mixture were also given as sudorifics.

5. In case of diarrhœa, dilution was first prescribed and then the white decoction. Laxative medicines were seldom admitted by the friends of the patient. Diafcordium and opiates were used in cases of obstinate diarrhœa.

6. In the advance of the distemper it was found more eligible to give the sudorifics at shorter intervals, when occasion required, than to augment the dose, which was apt to occasion disgust, and a rejection of medicine entirely ; consequences which also attended an attempt to heighten the power of the medicines themselves. The general design was to make their operation coincide with the periodical determination to the skin naturally occurring in the disease.

7. The

7. The sudorifics exhibited having but small power by themselves, it was found necessary to assist them by dilution, as well as in every other method which could be attempted. If the patient was not naturally inclined to drink, he was encouraged to it by offering agreeable liquids, either hot or cold at the person's option.

8. The diet was the same as in other acute distempers. No animal food stronger than chicken broth was allowed; the rest consisted of farinacea and leguminous vegetables. "It was certainly necessary (says our author) to a certain degree, to support nature by proper food; but to force it upon a nauseating stomach seems to have been irrationally recommended; and, where attempted, which the over care of the nurses frequently did, usually excited vomiting. I sometimes wished to give wine, but a religious bar lay in the way of Mahomedans, and a prejudice against it, in all fevers, rendered it equally inadmissible among the Christians and Jews."

9. For oppression at the præcordia, mild cordials, acidulated drinks and cool air were found useful. Throughout the disease access of cool air to the chamber was constantly allowed, and, where the chamber itself was not sufficiently airy, the bed was removed to the house top. Towards the height of the exacerbations, however, when there happened to be the least appearance of moisture on the skin, the sick were kept moderately covered up from the chin downward.

10. After the height, and through the decline of the disease, the bark in substance, or Huxham's tincture, were given instead of the ordinary sudorifics.

In the plague which took place in the Russian army, the greatest confidence seems to have been put in vomits. The disease commonly began with a dull pain in the head, resembling that produced by the fumes of charcoal, accompanied with shivering, universal weakness, &c.* On the first appearance of these a vomit was given, working it off with acid drinks. "If the nausea and bitter taste in the mouth was not removed by
" the

* Duncan's Med. Comment. vol. viii, p. 352.

“ the first, they gave a second, and sometimes a third or
“ fourth ; nay, they sometimes, if the symptoms were
“ very urgent, gave two or three in the space of twelve
“ hours, as there is no time to be lost in this disease ; for
“ they did not find this species of evacuation subject to
“ the same inconvenience with purges, which a man in
“ the plague is unable to support ; nay, they are even
“ dangerous, though he bears brisk vomits, and a repetition
“ of them, when the nature of the case requires it.

“ The stomach being thus cleansed, they gave every
“ morning a powder composed of twenty grains of rhubarb,
“ mixed with as much flower of brimstone, and three grains
“ of ipecacuanha, exhibiting also, every hour, five grains of pure nitre mixed with two grains
“ of camphor ; and, if costive, a laxative clyster was
“ given every evening, composed of decoction of camomile,
“ wine vinegar, with or without soap, according
“ to circumstances.

“ The head, temples and buboes were frequently
“ washed with warm vinegar, and the last urged to sup-
“ puration with emollient cataplasms ; but, in case they
“ were found to baffle all attempts to bring them forward,
“ they were then scarified or extirpated, and the patient
“ ordered to drink plentifully of *lime-water*. Bark was
“ given after evacuation, joined to the flower of brimstone
“ in the proportion of one ounce of the former to a drachm
“ of the latter, divided into sixteen powders, and taken in
“ twenty-four hours. When delirium came on, blisters were
“ applied to the legs and arms, and camphor given largely.
“ Vegetable and mineral acids were given indiscriminately ;
“ but they found the vegetable kind sometimes remain on the
“ stomach when the other was thrown up ; and of the latter
“ they preferred the vitriolic. Acidulated drinks were
“ given in quantity through the whole disease, and the food
“ consisted of acidulated water-gruel, and fruit when they
“ could procure any. The air of the room was kept charged
“ with acetous vapours, as much as possible, and it was
“ remarked, that, while the bitter taste remained, there
“ was little hope of the disease abating. According

According to Baron Ash, "the plague does not depend upon any constitution of the air, but is communicated only by contact, and they had repeatedly succeeded in suppressing it in different divisions of the army, by the immediate separation of the infected with their attendants, and burning every thing belonging to them, or that they had touched. They found the greatest advantage in keeping the soldiers ignorant of its existence till suppressed; for by this means they preserved their peace of mind, and health of body; and they found an exact military discipline the best preservative against the disease. For the cure of those infected they found the cold regimen, a free circulation of air, vegetable and mineral acids, ipecacuanha, rhubarb and bark, to be the properest remedies. That, to purify the air in hospitals appropriated for their reception, gun-powder was found most efficacious, probably from the commotion given to the air in explosion, over and above its action in common with other fumes. To resist infection, courage and fortitude of mind is necessary, as consternation and terror seem to prepare the body for the reception of the disease."

Dr. Sydenham seemed to have as great an opinion of bleeding, as the Russian physicians of vomits. Considering the plague as merely inflammatory, he lays the whole strength of the cure upon bleeding, which he greatly prefers to any other remedy. The quantities he took away were very considerable; and he gives an instance of a patient who died from not having enough taken away. He also informs us, that, during the civil wars in England, the plague raged in several places. Being accidentally brought to Dunstar castle in Somersetshire, a surgeon, who had travelled much in foreign parts, applied for leave to give the garrison what assistance he could. This being granted, he bled them, every man as he stood, without distinction, till ready to drop down; the blood was suffered to flow down upon the ground, so that no account could be taken of the quantity. They were then ordered to lie in their tents; and,

and, though no kind of remedy was given after bleeding, every one recovered.* Notwithstanding his opinion of bleeding, however, this celebrated physician was obliged to attempt the cure by sweating, which he says he preferred to bleeding on account of its not weakening the patient so much, nor hazarding the reputation of the physician; yet he says it is prejudicial in young people where the powers of life are strong. His improved method therefore was, first to bleed moderately, if no swelling had appeared, by which means a sweat would be more safely and easily raised. The bleeding is to be performed in bed, after which the patient must be covered up with the bed-clothes, and a piece of flanel applied to the forehead. This last expedient, he says, contributes more to the raising of a sweat than one would imagine. If no vomiting ensued, he administered sudorific medicines internally. But, if the stomach cannot retain any thing, he proposes to begin the sweating merely by the weight of the clothes, and now and then throwing part of the sheet over the face. The sweat being thus begun, the vomiting, however violent, generally stops, and the medicines will be retained, so that as plentiful a perspiration as we can desire may be excited. An instance of his success in this way he gives in an apothecary who applied to him in behalf of his brother. A sweat being proposed, the apothecary told him that he had given him several strong sudorifics, all of which had been thrown up; but the Doctor, having first sweated him moderately by the bed-clothes, afterwards gave him a large dose of Venice treacle; which operating powerfully, he recovered from the disease. He advises the sweat to be kept up without intermission for twenty-four hours; a smaller time being insufficient to

* Dr. Power, who wrote, in 1732, the *Ancient Physician's Legacy*, had lodged his soldiers in a church in which those who died of a plague had been buried. An hundred and eighty of the soldiers were seized either with petechiæ or buboes. He ordered them all to be bled in such quick succession, that the arm of the first was not bound up till the blood flowed from the last. Thus every one lost about an hundred ounces (upwards of three quarts.) He then ordered them water acidulated with spirit of vitriol for their drink; and by this treatment all recovered excepting eight, who would not refrain from spiritous liquors. This was transacted in Peru: but in Europe the plague will scarce bear bleeding to a few ounces. (Sauvages.)

to remove the disease, and a stoppage of the perspiration certainly attended with a return of the bad symptoms. On this occasion he censures Diemerbroeck and others for advising to stop the sweat on every slight occasion. The linen is to be allowed to dry on the patient's body, he must take all his liquids warm, and continue the use of a diluting fluid. Sage posset drink is what he recommends. Next morning the cure was finished by a purge of senna, tamarinds, &c. Where a swelling appears, he directs to forbear bleeding even in such as are not apt to sweat, lest the patient should die suddenly from a return of the morbid matter into the vessels. Bleeding, however, might be used with safety even in this case, provided a sweat was instantly to be raised; and thus he thinks the swelling might be dispersed perhaps with more safety than by waiting for its suppuration.

This may be accounted an epitome of the most approved modern practice in pestilential cases. The Russian physicians above quoted seem to speak with most confidence of their success. They, however, "lay great stress upon distinguishing the plague from the worst kind of malignant fever in hot countries; and it is not without reason, as bad consequences have attended the confounding of them on the breaking out of the plague. I am credibly informed that the great havock made in Moscow was principally owing to this circumstance; for it obtained some time before it was discovered by gentlemen unacquainted with the disease, and before they would acknowledge its existence, although some veteran army practitioners recognised its appearance under one of its forms, and endeavoured to alarm their brethren, but in vain, for a time."*

From this it is natural to conclude, that, when the disease was once fairly discovered and attacked by the powers of medicine, it could not make much resistance; yet Dr. Mertens, speaking of this very plague, says, that owing to the rapidity of the distemper, and many inducements

* Duncan's Med. Comment. vol. viii, p. 359.

ducement to conceal it, *little can be said of remedies* in the plague. He divides the distemper into two kinds, the nervous and putrid; the former "comprehending" merely that degree of confusion and disturbance given "to the nervous system on the first introduction of the" miasma, and the latter commencing at the time the miasma begins to operate upon the blood and other fluids by assimilating them to their own putrid nature." In the nervous state the miasma has sometimes been carried off by sweat, gentle diaphoretics, camphorated emulsions, juleps of camphor and musk. Gentle emetics, particularly ipecacuanha, were found useful; but James's powder (which was imported from England in great quantity) did not answer any good purpose. In the putrid state, the bark and mineral acids were useful; purgatives were hurtful, blood-letting inadvisable, and scarifying the carbuncles, recommended by almost every writer, attended with no good effect.

Few of the modern travellers who have visited the countries in which the plague is frequent, being versed in medicine, have said much about the cure of it. Martini only says, that, in the island of Cyprus, infected patients were allowed no other diet than pure water, panada, rice, tea, &c. Some thought to ward off the disease by drinking strong liquors, but these *almost always* fell victims to it. Whatever their methods were, indeed, they must certainly have been very ineffectual, since the same author informs us that, in the plague of 1759, in many parts of that island there were not a sufficiency of inhabitants left to cultivate the ground.

Diermerbroeck, whose name justly ranks high among those who have written on the plague, trusts mostly to sudorific medicines. Bleeding, according to him, is absolutely to be avoided, as well as purging and vomiting. He directed first that the chambers of the sick should be kept clean, and the air purified three or four times a day by fumigations, and that the sick should take (in the beginning, the first, second, or third day) a *sweating draught*, and being well covered with blankets
plentiful

plentiful sweats were promoted for two or three hours or more (always having a regard to the patient's strength.) If the patient did not sweat easily, bags filled with hot, dry sand were applied to the feet, armpits and groin. If the sick were not eased by the first sweat, it was repeated in a few hours; but if, after the second sweat, the fever and other symptoms still increased, it was the worst sign. After ten or twelve hours, and on the following days, they were repeated four or five times as occasion required. Besides this he directed apozems, antidotes, &c. which, as it is most probable they had no effect in removing the disease, it is needless to trouble the reader with,*

That

* As it might by some be deemed an affront offered to the wisdom of antiquity, should we pass over in silence the opinions of the more ancient physicians, I shall in this note give a short account of some of their most remarkable modes of practice, as they are recorded in Burnet's *Thesaurus*.

1. Forestus, in many respects a respectable author, recommends an *antidote* composed of equal parts of rue, figs and almonds, beat into a pulp in a stone mortar with a wooden pestle till united (which is not very easily done) into an uniform mass, adding as much syrup of citrons with vinegar as would render it soft, with a little powdered salt put in last. The efficacy of this he tells us he experienced in himself as well as all his family as a preventive; himself taking in the morning the bigness of a small nutmeg of this, made up into a confection with the ancient theriac, mithridate, Armenian bole, terrafigilata, &c.

In his regular practice (for the above must be accounted quackery) he advises bleeding within the first twelve, or at most twenty-four, hours; such as were bled afterwards he says died. If performed in seven or eight hours after the commencement of the disease the cure went on the better. Where bleeding was inadvisable he used cupping with scarifications, finishing the cure with sweating and cordials. He remarks that where black tumours or eschars, lentil shaped, appeared, the disease always proved mortal, without a single exception. These were small, like a grain of black pepper, and therefore called by the vulgar *peppercorn*; undoubtedly the *tokens* of Dr. Hodges.

2. Hildanus, also a respectable writer, has an high opinion of issues as a preventive. He says he never knew but one or two (and those of a very bad habit of body) who had issues in their legs and arms that perished in the plague, and says that he has known its efficacy as a preventive not only in himself but many others. He says he kept two issues in his own body, one in the left arm, the other in the right leg. (See above p. 339.) To the same purpose Mercurialis relates that he never knew but one, and he was a *priest*, who died of the plague having an issue. He says also that he had inquired of many other physicians, who all gave a similar testimony. According to him, in the plague at Lausanne, all who were attacked by vomiting or looseness, and almost all who were bled, fell victims to the disease.

As preventives he advises amulets made up of arsenic, powder of *toads*, and other things. These are to be hanged round the neck in times of plague, and are undoubtedly of great virtue (*maximam ad preservationem vim habere, non est quod dubites!*) This remedy he says he had from his preceptor *Cosmas Sotanus*, a very celebrated surgeon.

Brine of pork is another preventive, which he never tried himself, but asks Sennertus about it. It was recommended to Hildanus by a lawyer of his acquaintance. The brine is first to be boiled in a kettle, and well skimmed,

till

That a free perspiration is the natural cure of the plague, seems to be allowed by almost all writers of credit. Dr. Ruffel says, "Of all excretions, *that* by the skin " would seem to be the most materially important in " the plague. Where the skin remains perpetually dry, " or where short and precipitate sweats are attended " with no favourable alteration, danger is always to be " apprehended. On the other hand, sweats, at certain " periods

till it becomes clear, poured into earthen vessels, and kept shut up from the air for a twelvemonth; after which it was fit for use. A draught of this was given to people infected with plague, and operated by sweat, stool or vomit, or perhaps both by vomit and stool. The patient was to abstain from drink for some hours after. The brine of *anchovies* is recommended by Sam. Formius, as useful in the plague at Montpellier in 1630.

3. The same author (Formius) tells us of a man and his wife and wife's sister, in Montpellier, who, being taken with the plague, swallowed a solution of their own excrements in urine, *strained through a linen cloth*, and thus got clear of the distemper. It produced excessive vomiting and purging. Dr. Ruffel mentions one of his patients, who, he suspected, had got a dose of bezoar in urine.

4. Johannes Helmontius says, that *to his certain knowledge* (me conficio) *Hibernus Butlerus* cured some thousands of the plague, at London; though unhappily our author got only part of the secret, and which is to the following purpose. " He ordered me to suspend by the legs before the fire, a large *toad* " taken in the afternoon in the month of June; putting below him a cake of " yellow wax. At length, after three days suspension, the toad vomited " earth, and some *walking insects* (*insectas ambulantes*) viz. *flies* with shining " wings of a greenish colour, as if gilt: the toad died immediately after this " evacuation, nor did it take place, notwithstanding his suspension till the " third day. He (Butlerus) then told me that I had medicine enough for curing *forty thousand* people infected with the plague, and promised to show me " the mystery of the matter (*rei cardinem*) but being suddenly sent into banishment he departed." The best part of the secret being thus lost, it is needless to trouble the reader with any further account of experiments made with other toads roasted alive, powdered and made up into troches, &c. presuming that these could not equal the value of the original receipt. I proceed therefore,

5. To the antidote of the celebrated Avenzoar, who drove away the plague by the smell of the *urine* of an *he goat*; and Mercurialis says that in the house of a most reverend canon in Hungary, he saw a large *he goat* kept for this purpose.

6. From such horribly disgusting remedies we certainly turn with pleasure to the elegant tablets prepared for the Emperor Maximilian II. These were composed of Armenian bole, prepared pearl, prepared coral, prepared emeralds, prepared jacinth, gold-leaves (ingredients in a medical view equally efficacious with chalk or oyster shells) along with a little ambergrease and some other ingredients of little value, as medicines, and made into tablets with conserve of roses.—It is needless to spend time in commenting on such ridiculous remedies; suffice it to say, that the intention of all rational practice both ancient and modern has been to effect a cure by sweating. From the instance related by Sydenham, as well as that of Dr. Power above mentioned, it seems, that if the exact time in which the disease begins could be known, it might be carried off by profuse blood-letting; but as this for the most part cannot be discovered, it is certainly better to wait, even though the event should not prove favourable, than to run the risk of killing the patient instantly by an ignorant effort to save him.

"periods of the disease, appeared clearly critical in a greater or less degree. They were followed by a manifest alteration for the better, and by their repetition the fever was carried entirely off, or reduced to symptomatic exacerbations, seemingly dependent on the eruptions." He adds, that he never observed blood exude through the pores, nor did he observe the sweat to be remarkably offensive; or in any degree so remarkable as in some eruptive fevers, particularly in the small-pox before eruption. Dr. Hodges, however, says that in the plague of London sweats were sometimes extremely acrid and fœtid; and that they were met with of various colours, such as purple, green, black, or blood-coloured. Sometimes it was cold, though the patient was tormented with intolerable inward heat and drought; and would continue even after death; but he was of opinion that sweat is the natural crisis of the distemper.

Besides those symptoms of the plague which have been enumerated, there are others, particularly hæmorrhages and convulsions, with which it is sometimes attended. These it has in common with the yellow fever, and therefore are considered in the second part of the work. I now conclude this part with a short retrospect of the principal facts which to me seem to be the result of the investigation. 1. That the plague is of an unknown (I believe it of *divine*) original. 2. That in the countries on which it first was sent, it still remains, and from them has always been propagated to others, without a single well attested instance to the contrary. 3. That the means by which the distemper usually has been propagated are *war* and *commerce*. 4. That the disease differs from all others in having a more violent tendency to inflammation, insomuch that it approaches to actual accension; nay, that the extraordinary instances of spontaneous burning we read of are to be accounted only the highest degree of this disease. 5. That the immediate or proximate cause of the plague is a tendency in the blood and other fluids to discharge upon certain parts the latent heat they contain, in such quantity as to destroy

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stroy these parts entirely, and to convert them into a kind of coaly substance. 6. That this tendency depends on a certain inexplicable action of the external atmosphere, particularly of the elementary fire contained in it, and of which it principally consists.* 7. The approach of a plague cannot be foretold, either from the constitution of the atmosphere, earthquakes, storms, or any other natural phenomena. 8. The plague is an eruptive disease, and it is known to be so by the *certain death* of all in whom eruptions do not appear; a tendency to eruption being *always* observed where life remained long enough. 9. The contagion of the plague diffuses itself from a small space all around, lessening in violence the farther it is diffused. In its most concentrated state it hath proved invincible by medicine; in its mild state it requires none;† so that in the plague the medical powers are found of less avail than in any other acute distemper. 10. The natural cure of the plague is by perspiration or sweat, and this perhaps is the only evacuation which ought to be kept in view, as having a salutary tendency, by those who attend the sick.‡

* These two last conclusions (though I believe them myself) are proposed only as probable conjectures, which as yet I see nothing to contradict.

† See p. 282.

‡ The operation of oil so much recommended by Mr. Baldwin is said to be by producing sweat. (See above p. 341.)

A
T R E A T I S E
ON THE
Plague and Yellow Fever.

PART SECOND.
Of the Yellow Fever.

WE now come to treat of a disease, less fatal indeed than the Asiatic plague, but yet so deadly in its nature in the Western World, that it has of late been confounded with the former, and attempts made to prove that they are both to be considered only as degrees of the same disease, and that both have been recorded by historians indiscriminately under the common appellation of *plague* or *pestilence*. To investigate this matter candidly, and to show that there is a real and essential difference between the two, as far as we can credit testimonies drawn from the most respectable writers, shall be the work of the following part of this treatise.

SECTION I.

History of the Yellow Fever.

THE distemper now under consideration has been commonly distinguished by two different names; one of which is the *Yellow Fever*, the other the *Black Vomit*. Both of these are taken from symptoms so remarkable

markable (though not occurring in every case) that, had the disease existed in ancient times, we can scarce think but some of the historians of antiquity would have taken notice that in such a plague those who died generally became yellow, or that they had a continual vomiting of black matter, which could not be stopped. Black or bilious vomitings are indeed mentioned, though not as the principal symptom, but the yellow colour is not once taken notice of. Dr. Hodges indeed mentions a single instance of a patient who became all over of a *green* colour; but as a change of colour is not taken notice of in the plague as a general symptom, either by him or by any other writer, we must conclude that this distemper (the yellow fever) has been observed only in modern times.

When Columbus first visited the West India islands, we hear nothing of his having found such a disease existing there; nor does it appear that it was known among the many Spanish adventurers who succeeded him, and who subdued such immense tracts on the Southern Continent. Soon after the settlement of some of the West India islands, however, by other European nations, this disease began to make its appearance, though at what time is still uncertain. Dr. Hillary says, that, "as we have no accounts of this disease in the ancients, nor even in the Arabian writers, who lived and practised in the hot climate, we must give it *some name*;" and he calls it the *putrid bilious fever*. "From the best and most authentic account (adds he) that I can obtain, as also from the nature and symptoms of the disease, it appears to be a disease that is indigenous* to the West India islands and the continent of America which is situated between the tropics, and most probably to all other countries within the torrid zone. But I cannot conceive what were the motives which induced Dr. Warren to think that this fever was first brought from Palestine to Marseilles, and from thence to Martinique, and so to Barbadoes, about thirty-seven years since (1721 or 1722.) A better inquiry would

" have

* Naturally belonging to the climate.

“ have informed him, that this fever had frequently appeared, in this and the other West India islands, many years before : for several judicious practitioners, who were then, and are now, living here, whose business was, visiting the sick the greatest part of their life time, some of them almost eighty years of age, remember to have seen this fever frequently in this island, not only many years before that time, but many years before that learned gentleman came to it.”

To the same purpose Dr. Mosely says, “ Warren, though he lived at Barbadoes in 1739, supposes it never appeared in that island till about the year 1721, and that it was then brought from Martinique in the Lynn man of war. He says the second appearance of it there was in 1733, and that it then came also from Martinique. He undertakes to show, that it is a disease of Asiatic extract ; and says, that a *Provencale* fleet arrived at Port St. Pierre in Martinique, from Marseilles, on board which were several bales of Levant goods which were taken in at Marseilles from a ship just arrived from St. Jean D’Acre (probably the Ptolemais of the ancients.) Upon opening these bales of goods at Port St. Pierre, this distemper immediately shewed itself ; many of the people were instantly seized, some died almost suddenly, others in a few days, and some lingered longer ; and the contagion, still spreading, made great havock at the beginning. He says he had this account from Mr. Nelson, an English surgeon, who was seized with the disease at Martinique, and died of it a few days after his arrival at Barbadoes. He says, it is very probable that the same fever, or one of very near resemblance and affinity, may first have been carried among the American Spaniards (among whom it is now endemic) in somewhat a like manner ; and that possibly some peculiar qualities in the air and climate might have fostered and maintained it there ever since.”

Dr. Mosely at once concludes the whole of this account to be *fabulous*, but whether fabricated by Dr. Warren or the surgeon, he does not say. He then appeals

peals to Dr. Towne, who wrote before Warren, in 1776, but takes no notice of this *chimerical* origin of the yellow fever, but considers it as an endemical disease in the West Indies. Hillary's opinion already given is also quoted.

The next evidence is that of Mr. Hughes, who, though not a medical man, has written on the first appearance of the yellow fever in Barbadoes in the following terms: Dr. Gamble remembers that it was very "fatal here in the year 1691, and that it was then called the *new distemper*, and afterwards *Kendal's fever*, the *pestilential fever*, and the *bilious fever*. The same symptoms did not always appear in all patients, nor alike in every year when it visited us. It is most commonly rife and fatal in May, June, July and August, and then mostly among strangers; though a great many of the inhabitants, in the year 1696, died of it; and a great many at different periods since."

As to the first appearance of the disease in the West India islands we have no accounts which have been deemed sufficiently authentic, though indeed it must be confessed that the doubts seem to be derived as much from an attachment to theory as to the investigation of truth. "The *endemial causus*, or *yellow fever*, (says Dr. Mosely) which is the terror of Europeans newly arrived in the West Indies, is called by the French *la maladie de Siam*. Monsieur Pouppe Desportes, who practised physic at *St. Dominique* from 1732 to 1748, and who had more experience, and has written from better information on the diseases of that colony, than any of his countrymen, says that this fever was so called from its being first taken notice of in the island of Martinique at a time when some vessels were there from Siam. This account, though probably true enough as to the time of its being first observed in the French colonies, is extremely incorrect in other respects: for M. Desportes has not only admitted a supposition that the disease originated among these East Indian mariners, but calls it pestilential, and says that the Europeans are almost the only victims to it.

"The

“ The generality of the French writers say that it was brought directly from Siam, in a merchant ship, and communicated to the people of Martinique, whence the contagion was carried to St. Dominique, but that sailors were the only people attacked by it, whence it was called *la fièvre matelotte*.”

This account seems to carry no improbability in it ; nevertheless Dr. Mosely rejects it upon grounds that are very far from being indisputable. “ The French writers (says he) have not been at the trouble to consider that a disease brought from Siam in the East Indies, in a similar latitude to the West India islands, would be most likely to affect the natives, living in a climate similar to that in which the disease originated, rather than the Europeans of so different a temperament of body.” But this argument would prove too much ; for if the disease would be most likely to affect the natives in a climate *similar* to that in which the disease originated, surely it would be still more likely to attack the natives in *that very climate* in which the disease did originate, and that Europeans would be free. But the very reverse is the case. The disease, according to Dr. Mosely himself, originates in the West Indies ; and yet Europeans, especially those newly arrived, are particularly objects of its vengeance.

“ But (adds our author) the fact is, that this disease never attacks either white or black natives of hot climates ; neither was it brought from Siam ; and though it is possible, from the heat of the climate, that it may frequently appear there, or in any other tropical country (though BARRERE says it is unknown at *Cayenne*) no history of that country that I have yet met with mentions such a disease ; notwithstanding what many writers have boldly advanced to the contrary.”

Here it is evident we have no argument, but a parcel of assertions, the first of which contradicts what he had just before quoted from Mr. Hughes. For the latter informs us that in 1696 a great many of the *inhabitants* died of it as well as strangers. His not meeting

meeting with it in any history of Siam is not a proof of its non-existence in the country, neither indeed does he himself think that it is so, as he tells us that it may possibly appear there, or in any other tropical country.

In Sauvages's Nosology we find the plague distinguished into a number of different species, among which there is one called the *plague of Siam*. This, he says, was in the year 1685 brought from Siam to Martinico; in the ship called the *Oriflame*. This seems to have been the *yellow fever*, and the symptoms are considered in the following section. This date agrees exactly with what Mr. Hughes says in the place above quoted, that it was violent in Barbadoes in the year 1691, when it went by the names of the *new fever*, and *Kendal's fever*. Both these names imply that the disease had been but lately known, and that it was by no means a native of the climate. It must either have been *imported* therefore from some other country, or it must have *originated* in consequence of the settlement of some Europeans in a climate so dissimilar to their own, while some of them still continued to ramble from one country to another, occasionally visiting all, without taking up their residence in any.

Martinique seems to have been the first place where this distemper made its appearance; and from thence it seems quickly to have extended itself to St. Domingo and Barbadoes. Its farther progress, however, cannot be traced, nor can we tell exactly what time it first entered the continent. Whether the true plague was ever imported into the Western Continent cannot at present be ascertained, neither can we tell what diseases the Indians were subject to before the arrival of the Europeans. The Spaniards, who first arrived, are allowed to have been less subject to the plague than other nations,* but they were quickly followed by those who had no such exemption. Sebastian Cabot discovered the North American Continent for Henry VII of England, very soon after, if not before Columbus discovered the Southern Continent for the king of Spain. This was a very suspicious time; for Henry VII himself had introduced

* See p. 319.

roduced the sweating sickness into England only thirteen years before ;*, and in those days the plague seems never to have been eradicated ; so that it is by no means impossible that these first adventurers might have communicated to the Indians with whom they had any communication, the seeds of diseases totally unknown to them before. Certain it is, that the North American Indians were subject to epidemics before the settlement of any English colonies among them. Hutchinson in his History of Massachusetts takes notice of the Indians having been greatly weakened by an epidemic, which was attributed to an unfavourable season, in consequence of which they were obliged to feed upon unripe squashes, fruits, &c. We know not the nature of the distemper, though, from the circumstance just mentioned, we may not unreasonably conjecture it to have been of the pestilential kind. That epidemics still continue among these people we also know from the testimony of Capt. Carver, who found one of their towns deserted, and the inhabitants fled into the woods, on account of an epidemic disorder ; but what the nature of it was he does not inform us.†

Mr.

* See p. 17.

† In Belknap's Biography we have a more particular account of this *pestilence*, as it is called, and which, if the relations there given are to be credited, certainly determines the disease in question to have been the yellow fever. The account is to the following purpose : Lord Arundel, of Wardour, had employed a captain Weymouth to search for a N. W. passage to India. In this he failed, but falling in with a river, supposed to be either the Kennebeck or Penobscot, he brought from thence five of the natives, with whom he landed at Plymouth in July 1605. Three of the Indians were taken into the family of Sir Ferdinando Gorges ; and from these many particulars were obtained respecting their country, which being eagerly attended to by Gorges, he formed a plan of advancing his fortune by a thorough discovery of the country. Two vessels were accordingly fitted out ; one of which failed, but the other brought such information as gave encouragement to attempt the founding of a colony. Two of the natives who had been brought to England were sent back, and 45 persons were left on the continent to begin the settlement ; but these, having undergone great hardships, quitted the place in 1608. Gorges, however was not discouraged. He sent out one of his servants, by name Richard Vines, and some others, whom he hired to stay in the country all winter.

“ Mr. Vines and his companions were received by the Indians with great hospitality, though their residence among them was rendered hazardous ;
 “ both by a war which raged among them, and by a pestilence which accompanied or succeeded it.

“ This war and pestilence are frequently spoken of by the historians of New England, as remarkable events, in the course of Providence, which
 “ prepared

Mr. Webster, in his eighth letter to Dr. Currie on the subject of pestilential diseases, quotes from the Doctor's letter to Mr. Wynkoop, of October 5th, 1797, the following passages: "Thomas Story and Joseph Gough relate, that a malignant fever prevailed in Philadelphia in 1699, introduced from the West India islands. . . . Dr. Mitchill ascribes the yellow fever as it appeared in Virginia in 1741 and 47 to specific contagion, and mentions that it had been twice imported into Virginia by his Majesty's ships of war. Dr. Leamy (*Lining*) in the *Physical Essays* in Edinburgh, informs us, that the yellow fever which has prevailed at different periods at Charleston, South Carolina, was always traced to some infected person recently from the West Indies. In 1741 it was introduced by a chest of wearing apparel which had been longed

prepared the way for the establishment of an European colony. Concerning the war, we know nothing more than this, that it was begun by the Taratenes, a nation who resided eastward of Penobscot. These formidable people surprised the bathaba, or chief sachem, at his head quarters, and destroyed him with all his family; upon which all the other sachems who were subordinate to him quarrelled among themselves for the sovereignty; and in these dissensions many of them as well as of their unhappy people perished. Of what particular kind the pestilence was, we have no certain information; but it seems to have been a disorder peculiar to the Indians, for Mr. Vines and his companions, who were intimately conversant with them, and frequently lodged in their wigwams, were not in the least degree affected by it, though it swept off the Indians at such a prodigious rate that the living were not able to bury the dead, and their bones were found several years after, lying about the villages where they had resided. The extent of this pestilence was between Penobscot in the east, and Narraganset in the west. These two tribes escaped, whilst the intermediate people were wasted and destroyed."

This distemper appears to have raged among the Indians in the year 1616. The following particulars are further given in Belknap's Biography, vol. ii. p. 208: "Hitherto they (the English colonists) had not seen any of the natives at this place. The mortal pestilence which raged through the country, four years before, had almost depopulated it. One remarkable circumstance attending this pestilence was not known till after this settlement was made. A French ship had been wrecked on Cape Cod. The men were saved, with their provisions and goods. The natives kept their eye on them, till they found an opportunity to kill all but three or four, and divide their goods. The captives were sent from one tribe to another, as slaves. One of them learned so much of their language, as to tell them that God was angry with them for their cruelty, and would destroy them, and give their country to another people. They answered that they were too many for God to kill. He replied, that if they were ever so many, God had many ways to kill them,

* "The Pawkunnawkutts were a great people heretofore. They lived to the east and northeast of the Narragansetts, and their chief sachem held dominion

"longed to a person who died of it from Barbadoes." These quotations are made by Mr. Webster with a view to dispute the contagious nature of the disease. Here they are introduced only to show if possible the time that the disease first entered the United States; and the introduction of it into Philadelphia in 1699 (though we are not sure if even this was its first appearance, still corresponds extremely well with the date of its introduction into Martinique mentioned by Sauvages. Dr. Lining says it had been four times epidemic in Charleston before the time that he wrote; viz. in 1732, 1739, 1745, and 1748. Hence we may conclude, that this fever, on the northern part of the continent of America, has been nearly coeval with the settlement of the British colonies there; for we cannot suppose that we have accounts of the very first time that it made its appearance

"them, of which they were then ignorant. When the pestilence came among them (a *new disease*, probably the *yellow fever*) they remembered the Frenchman's words; and when the Plymouth settlers arrived at Cape Cod, the few survivors imagined that the other part of his prediction would soon be accomplished. Soon after their arrival, the Indian priests or powows convened, and performed their incantations in a dark swamp three days successively, with a view to curse and destroy the new comers. Had they known the mortality which raged among them, they would doubtless have rejoiced in the success of their endeavours, and might very easily have taken advantage of their weakness to exterminate them. But none of them were seen till after the sickness had abated; though some tools, which had been left in the woods, were missing, which they had stolen in the night."

"minion over divers other petty sagamores; as the sagamores upon the island of Nantuckett, and Nope, or Martha's Vineyard, of Nawsett, of Manna-moyk, of Sawkattukett, Nobsquasitt, Matakées, and several others, and some of the Nipmucks. Their country, for the most part, falls within the jurisdiction of New Plymouth colony. This people were a potent nation in former times, and could raise, as the most credible and ancient Indians affirm, about three thousand men. They held war with the Narragansitts, and often joined the Massachusetts as friends and confederates against the Narragansitts. This nation, a very great number of them, were swept away by an epidemical and unwonted sickness, an. 1612 and 1613, about seven or eight years before the English first arrived in those parts to settle the colony of New Plymouth. Thereby Divine Providence made way for the quiet and peaceable settlement of the English in those nations. What this disease was, that so generally and mortally swept away, not only these but other Indians, their neighbours, I cannot well learn. Doubtless it was some pestilential disease. I have discoursed with some old Indians, that were then youths, who say, that the bodies all over were exceeding *yel-*
low (describing it by a yellow garment they showed me) both before they died, and afterward.

"The Massachusetts, being the next great people northward, inhabited principally about that place in Massachusetts bay, where the body of the English now dwell. These were a numerous and great people. Their chief
 "sachem,

appearance any where. Numbers of individuals would probably be affected with it, and their cases pass unnoticed, till the general malady attracted the public attention.

In the Spanish dominions it seems to have been otherwise. Dr. Moseley quotes Don Ulloa saying that "the vomito prieto, or black vomit, was unknown at Carthage-
" gena, and all along the coast, till the years 1729 and
" 1730. In 1729 Don Domingo Justiniani, commodore
" of the guarda costas, lost so considerable a part of his
" ships' companies at *Santa Martha*, that the survivors
" were struck with astonishment and horror at the
" havock made among their comrades. In 1730, when
" the galleons under Don Manuel Lopez Pintado came
" to Carthagena, the seamen were seized with the same
" dreadful mortality, and so sudden were the attacks of
" the

" sachem held dominion over many other petty governors; as those of Wee-
" chagaskas, Neponsett, Punkapaog, Nonantum, Nashaway, some of the
" Nipmuck people, as far as Pocumtucke, as the old men of Massachusetts
" affirmed. This people could, in former times, arm for war about three
" thousand men, as the old Indians declare. They were in hostility very of-
" ten with the Narragansetts, but held amity for the most part with the Paw-
" kunnawcutts, who lived on the south border, and with the Pawtucketts, who
" inhabited on their north and northeast limits. In an. 1612 and 1613 these
" people were also sorely smitten by the hand of God with the same disease
" before mentioned; which destroyed the most of them, and made room for
" the English people of Massachusetts colony, which people this country, and
" the next called Pawtucket. There are not of this people left at this day
" above three hundred men, besides women and children.

" Pawtucket is the fifth and last great sachemship of Indians. Their coun-
" try lieth north and northeast from the Massachusetts, whose dominion reach-
" eth so far as the English jurisdiction, or colony of the Massachusetts, doth
" now extend, and had under them several other smaller sagamores; as the
" Pennakooks, Agawomes, Naamkeeks, Pascatawayes, Accomintas, and others.
" They were also a considerable people heretofore, about three thousand men,
" and held amity with the people of Massachusetts. But these also were al-
" most totally destroyed by the great sickness before mentioned; so that at
" this day they are not above two hundred and fifty men, besides women and
" children. This country is now inhabited by the English under the govern-
" ment of Massachusetts." (Cookin's Historical Collections of the Indians
in New England.)

The following was communicated to Benjamin Basset, esq. of Chilmark, by Thomas Cooper, a half blooded Indian, of Gay Head, aged about sixty years; and which, he says, he obtained of his grandmother, who, to use his own expression, was a stout girl when the English came to the island: "Before
" the English came among the Indians, there were two disorders of which
" they generally died, viz. the consumption and the yellow fever. The latter
" they could always lay in the following manner: After it had raged and swept
" off a number, those who were well, met to lay it. The rich, that is, such
" as had a canoe, skins, axes, &c. brought them; They took their seat in a
" circle, and all the poor sat around without. The richest then proposed to
" begin

“ the disease, that persons, walking about one day, were
 “ the next carried to their graves. Unhappily, after all
 “ the experiments of the surgeons of the galleons, and
 “ physicians of the country, no good method of treat-
 “ ing the disease has been discovered; no specific for
 “ curing it.”

This fatal disease, however common in the southern and warm part of the continent of America, seems not to have exerted its power in the more northern and temperate climates till the year 1793. Since that time its ravages have been too well known to require an enumeration here. To describe the symptoms, inquire into the causes, and the means of prevention and cure, is a work of more importance, and to this we must now proceed.

“ begin to lay the sickness; and, having in his hand something in shape resembling his canoe, skin, or whatever his riches were, he threw it up in the air; and whoever of the poor without could take it, the property it was intended to resemble became for ever transferred to him or her. After the rich had thus given away all their moveable property to the poor, they looked out the handsomest and most sprightly young man in the assembly, and put him into an entire new wigwam, built of every thing new for that purpose. They then formed into two files at a small distance from each other; one standing in the space at each end put fire to the bottom of the wigwam on all parts, and fell to singing and dancing. Presently the youth would leap out of the flames, and fall down to appearance dead. Him they committed to the care of five virgins, prepared for that purpose, to restore to life again. The term required for this would be uncertain, from six to forty-eight hours, during which time the dance must be kept up. When he was restored he would tell, that he had been carried in a large thing high up in the air, where he came to a great company of white people, with whom he had interceded hard to have the distemper laid, and generally, after much persuasion, would obtain a promise, or answer of peace, which never failed of laying the distemper.”

The following is extracted from Prince's Chronological History of New England, p. 46: “ This winter (1617) and the spring ensuing, a great plague befals the natives in New England, which wasteth them exceedingly; and so many thousands of them die, that the living are not able to bury them, and their skulls and bones remain above ground at the places of their habitations for several years after.

“ By Capt. Dermer's letter of Dec. 27, 1619, in Purchas, and of June 20, 1620, in Gov. Bradford, compared with Gov. Bradford's own account, it seems that the Narragansetts in the west, and Penobscots in the east, escaped this plague, or that it raged only in the countries lying between them, and prepared the way for another people.”

SECTION. II.

Symptoms of the Yellow Fever, as described by various authors.—Comparison between them and those of the Plague, with an inquiry into the Causes.—History of the Distemper as it has appeared in various parts of the United States since the year 1793.—A discussion of the question Whether the Yellow Fever is Contagious or not.

OF all those who have attempted to give an account of this fatal disease, none appear to have exceeded Dr. Moseley, either in his accuracy in enumeration, or perspicuity in description, of the symptoms. According to him the yellow fever is a species of the *kausos* of Hippocrates, Aretæus and Galen; that is, the *febris ardens* or *causus*, aggravated by climate, incidental only to the gross, inflammatory and plethoric at any season of the year, totally different from the remitting bilious fever to which all habits of body are subject in hot climates, particularly after rains, and in the fall of the year. The *causus*, seldom seen in the temperate climates of Europe, never appears there with the violent symptoms which attend it in hot climates. “Whether in the latitudes (says he) so mild as those of Spain, Greece, Italy and the Archipelagan islands, the *causus* has ever been attended with black vomiting, as in the West-Indies, I cannot tell. Lommius mentions the vomiting of blood, and voiding black liquid stools and black urine. Critical and symptomatical yellowness of the skin in the *causus* are enumerated by Hippocrates among its symptoms, and Lommius mentions the danger of that appearance before the seventh day. The affinity of the symptoms, progress and termination of a *causus* in Europe to those of the yellow fever in the West-Indies, excepting the black vomiting, leaves no room to doubt that the difference of climate constitutes all the difference that is found between them.”

For these reasons Dr. Moseley adopts the name of *essential causus*; and he takes notice that many difficulties

ties have arisen to young practitioners, and to strangers in the West-Indies, from the various names improperly given to it from its ultimate and not from its primary symptoms. Some calls it a *burning* bilious fever; Warren, a *putrid* bilious fever; but, though they have disputed about their terms, Dr. Moseley thinks that neither of them have proved whether bile be the cause or the effect of the disease. To call it the black vomit or the yellow fever, he thinks also improper, as a stranger would not know the disease until some of these symptoms appear; both of which are generally fatal, and neither of them constant.

The West-India caufus he says is no more putrid than the small-pox, or any other acute disease; which may, after it has passed its inflammatory state, change to putrefaction, and end in death with an extraordinary dissolution of the fluids. The disease is in truth an inflammatory one in the highest degree possible; accompanied with such symptoms in a greater extent as attend all inflammatory fevers, and most strikingly the reverse of any disease that is putrid, or of one exacerbation. It obeys no season of the year, and attacks such people, and under such circumstances, as are seldom the objects of putrid diseases, viz. all who are of an inflammatory diathesis, and do not perspire freely.

This distemper attacks sailors in the West-Indies more than any other set of men, even of new comers. For this the Dr. assigns as a reason, that they eat, drink, and sleep, so much at sea, use no exercise, and are always of gross habit of body. To this he adds the heat and dampness of harbours, generally in the neighbourhood of marshes, and their exposure to land winds at night; the labour they endure on board vessels in port, and the carelessness and excesses frequently committed by these people after long voyages.

When a stranger newly arrived feels a sudden loss of strength, with a continual desire of changing his position without finding rest in any, we may expect a caufus. If he has exposed himself to any of the causes just mentioned, the probable consequences would be, that on the
morrow

morrow he would feel an heaviness, lassitude, oppression and loss of appetite.* Next day, or perhaps within twelve hours from the first indisposition, the violence of the disease commences with faintness, generally giddiness of the head, with a small degree of chillness and horror, but never any rigor. These symptoms are succeeded by a high fever, great heat, and strong beatings of the arteries, particularly those of the temples and carotids; flushings of the face, gasping for cool air; tongue white tinged with yellow, after the retchings have commenced; excessive thirst; redness, heaviness, and sensations of burning in the eyes; heaviness and darting pains in the head, small of the back, and often down the thighs; the pulse generally full and strong, but sometimes quick, low, and vaccillating; the skin hot and dry, though sometimes it has a partial and momentary moisture. There is a sickness of stomach from the beginning; retchings succeed immediately after any liquid is swallowed, which bring up bilious matter. There is an anxiety with stricture, soreness, and intense heat about the præcordia; great restlessness, heavy respiration, sighing, urine deep coloured and in small quantity.

Thus the fever goes on during its first stage, which constitutes the inflammatory period, and continues from twenty-four to sixty hours. The second, which our author calls the *metaptosis*, is comparatively mild, and is an intermediate state between the inflammatory and gangrenous stages. In this there is an abatement of many of the former symptoms, and a kind of deceitful tranquillity, accompanied, however, with a perturbation, if the patient should happen to sleep. There now appears a yellow tinge in the eyes, neck and breast; the heat subsides, sometimes accompanied with chillness, but never with that kind of rigor, which, when it happens, terminates the disease by sweat, or by copious bilious evacuations, upwards or downwards. The retchings increase and become porraceous: the pulse flags, but is sometimes high, and

* " This (says the Doctor) is the time to extinguish the disease; but Europeans and North Americans generally neglect it, as they are not accustomed at home to have recourse to medicine on the first moment of indisposition."

and sometimes soft ; the skin moist and clammy ; urine of a dark saffron colour, and in small quantity ; the tongue in some cases is dry, hard, and discoloured, in others furred and moist ; the head is confused, sometimes with delirium, with a glossiness of the eyes. This stage of the disease continues sometimes only for a few hours, at others from twelve to forty-eight, seldom longer, and too frequently the disease hurries on rapidly from the first to the third stage, which is the gangrenous or fatal state. Now the pulse sinks, intermits, and becomes unequal, sometimes very quick ; the vomiting becomes frequent with great straining and noise. The matter discharged is now in greater quantity, appearing like the grounds of coffee, or of a slate colour, and the stomach can retain nothing : the breathing is difficult, the tongue black, the sweats cold and clammy, the eyes yellow and sunk ; there is a yellowness round the mouth and temples, and soon after over the whole body. The deepening of the yellow colour, with an aggravation of the other symptoms, is a forerunner of death. There is a deep respiration, subsultus tendinum, a convulsive kind of sighing ; the urine is quite black, and sometimes totally suppressed. There is a death-like coldness of the hands, feet and legs, while the heat still remains about the stomach ; the patient is delirious, and struggles to get up in bed ; he trembles, his speech falters ; blood oozes from the mouth and nostrils, sometimes from the corners of the eyes and ears ; a black bloody cruor is discharged both by vomit and stool : livid spots appear on different parts of the body, particularly the præcordia ; hiccup, muttering, coma, and death, follow in quick succession.

The affecting case of capt. Mawhood, who died on the fourth day of the disease, at Port-Royal in Jamaica, in the year 1780, exhibits a dreadful picture of this disease in its last stage. “ When I entered the room, (says Dr. Moseley) he was vomiting a black, bloody cruor, and “ he was bleeding at the nose. A bloody ichor was “ oozing from the corners of his eyes, and from his mouth “ and gums. His face was besmeared with blood, and

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“ with the dullness of his eyes it presented a most distressing contrast to his natural visage. His abdomen was swelled and inflated most prodigiously. His body was all over of a deep yellow, interspersed with livid spots. His hands and feet were of a livid hue. Every part of him was cold, excepting about his heart. He had a deep, strong hiccup, but neither delirium nor coma; and was, at my first seeing him, as I thought, in his perfect senses. He looked at the changed appearance of his skin, and expressed, though he could not speak, by his sad countenance, that he knew life was soon to yield up her citadel, now abandoning the rest of his body. Exhausted with vomiting, he was at last suffocated with the blood he was endeavouring to bring up, and expired.”

The symptoms just now enumerated generally take place in those who die from the third to the seventh day of the disease. But in this, as in other fevers, the symptoms vary considerably according to the constitution of the patient, and habit of the body. In some it begins neither with chillness, faintness, nor flushings of the face. Sometimes the pulse is much depressed and not quick; and in sultry weather, and damp situations, where the inflammatory state has been only of a few hours duration, the *metaptosis* has been so rapid, that the black vomiting and the mortified state have unexpectedly appeared, and have ended the patient in 24, 36 or 48 hours. But our author says that he never saw or heard of an instance of what Lind says, that the black vomit may attack a man when newly arrived, without any previous complaint; or of that mentioned by the same author, viz. “an uneasy itching sensation, commonly in the legs; and upon pulling down the stockings, streams of thin-dissolved blood followed, and a ghastly yellow colour quickly diffused itself all over the body.”

In some cases the disease is much more mild. There are instances where it has been protracted to the eighth, ninth or tenth day; and others where it has never passed from the inflammatory stage; but being checked, though not extinguished, it has been lengthened out, and

at last converted into a remittent of great duration, most difficult of cure, and tedious of recovery.

According to our author, the stomach seems to bear the principal burden of the disease, and accordingly, after death, appears to have been principally affected. Great heat is perceived near the præcordia during all the stages of the disease, and pain and uneasiness are complained of when those parts are pressed with the hand. After death, livid spots appear over the whole body, particularly about the præcordia. On dissection, the stomach, in some part or other, is generally found mortified, especially if the black vomiting has continued long, and the livid spots have appeared before death. Frequently the upper part of the duodenum is in a gangrenous state, and always bears the marks of inflammation, let the disease have been of ever so short a duration.

Though both liver and gall-bladder must be very much affected in this disease, yet Dr. Moseley is of opinion that nothing can be depended upon from an inspection of them after death. Some symptoms there are in common with inflammations of the liver, but none of those which distinguish it from other diseases. It never terminates in suppuration of the liver as the hepatitis sometimes does, though it is frequently carried off by an enormous secretion of bile. "Dissections (says the Doctor) have never discovered any certain and uniform appearance in the liver of those who have died of this disease. In hot climates a sound state of the liver is never to be expected after death, whether the disease has been acute or chronical. Of the latter class of diseases it is almost always either the seat, or the origin."

Dr. Lining, in a letter to Dr. Whytt at Edinburgh, published in the *Physical and Literary Essays*, defines the disease, to be "that fever, which continues two or three days, and terminates without any critical discharge by sweat, urine, stool, &c. leaving the patient excessively weak, with a small pulse, easily depressible by very little motion, or by an erect posture; and which is soon succeeded by an iſteritious (jaundice) colour

“ colour in the white of the eyes and the skin ; vomiting, hæmorrhages, &c. and those without being accompanied with any degree of a febrile pulse and heat.”

In the four times in which he mentions it to have been epidemic at Charleston, our author says, that none of the years (excepting 1739, the summer and autumn of which had been remarkably rainy) were either warmer or more rainy (and some of them less so) than the summers and autumns were in several other years in which there was not one instance of any one being seized with it. The subjects were whites of both sexes, especially strangers lately arrived from cold climates, Indians, Miltrees, Mulattoes of all ages, excepting young children, and of those only such as had formerly escaped the infection. Negroes were not liable to it.

Those affected with the fever, for a day or two previous to the attack generally complained of head-ach, pain in the loins and extremities, but principally in the knees and legs, debility and lassitude ; but some were taken ill suddenly without any warning. The symptoms were, shivering ; frequent, full, hard and strong pulse ; though sometimes small and hard, and in others soft and small ; but towards the end of the fever it became smaller, harder, and less frequent. Sometimes there was a remarkable throbbing in the hypochondria and carotids, the former causing in some a tremulous motion of the whole abdomen. The heat was about 102 of Fahrenheit, and nearly equal over the whole body ; some had frequent returns of chilliness without any diminution of temperature of the body. “ In a few there happened so great a remission of the heat for some hours, when at the same time the pulse was soft and less frequent, and the skin moist, that one from these circumstances might reasonably have hoped that the fever would only prove a remittent or intermittent. About the end of the second day the heat began to abate.” Here Dr. Moseley takes notice that when the fever abates, some, who have mistaken the *bilious remittent* for the *causis*, speak of remissions which do not happen in this fever. “ This circumstance of the endemial *causis* (says he) I believe, has never been mentioned before.” Dr.

Dr. Lining goes on to inform us, that the skin was rarely dry in this disease, there being generally a propensity to sweat. "On the first day the sweating was commonly profuse and general, on the second it was more moderate; but on both those, there happened frequent and short remissions of the sweatings, at which times the febrile heat increased, and the patient became more uneasy. On the third day the disposition to sweat was so much abated that the skin was generally dry; only the forehead and backs of the hands continued moist." A great despondency and prostration of strength took place from the first attack. On the first day they generally dozed much, but were afterwards very watchful. On the second day the pains in the head, loins, &c. of which they had complained before the attack, and which were sometimes very acute in the forehead, generally went off. Many on the first day were a little delirious, but afterwards not until the recess of the fever.

The blood had no inflammatory crust; in warm weather it was florid like arterial blood, and continued in one soft homogeneous like mass, without any separation of the serum after it was cold. When there was any separation, the crassamentum was of too loose a texture.

This disease was not attended with any remarkable thirst; but, on the third day, as the fever began to lessen, or rather, says the Doctor, as the fulness of the pulse, heat and disposition to sweat, began to abate, a nausea, vomiting, or frequent reachings to vomit, came on especially after the exhibition of either medicines or food. A very few had a vomiting, either bilious or phlegmatic, on the first day. The whole febrile state was attended with an obstinate costiveness.

These were the principal symptoms with which the febrile state was attended, and which generally went off on the third day, or in seventy-two hours from the first attack, without any salutary crisis, and was soon succeeded by the second *stadium*, as our author calls it; a state, though without a fever, much more terrible than the former. The symptoms now were,

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1. The pulse, though hard and small, became less frequent ; very little more so than in health. Soon after it became much slower, and very soft ; this softness remaining while any pulse could be felt. In many it gradually subsided, till it became scarce perceptible ; neither could it be supported by any of the ordinary means used for that purpose. After this the yellow suffusion, the vomiting, delirium, restlessness, &c. increased to a great degree. Sometimes the pulse would recover its strength, but only for a short time.

2. The heat did not exceed the natural, and was still farther diminished as the pulse sunk ; the skin became cold, and the face, breast and extremities acquired something of a livid colour. There was no great thirst, though the sick had a great inclination for strong liquors.

3. The vomiting or reaching to vomit increased, and in some were so constant, that neither medicines nor aliment of any kind could be retained. Some vomited blood, others only what was last exhibited, mixed with phlegm, while others had what is called the *black vomit*. But this, though its general appearance is black, appears not to be entirely so, but owes its colour to a great number of black flakey substances. These are by our author supposed to be the bile mixed with the mucus of the stomach, or adhering to it. He founds his opinion upon observations from dissection, where the mucus of the stomach was always found abraded, and the bile in its cystis black, and sometimes very viscid. This change in the state of the bile he has always observed in such as died of this disease, and likewise that the blood was very fluid, and the vessels of the viscera much distended. In one case he found the bile of the consistence of turpentine, and carbuncles or gangrenous specks on the stomach.

The reaching to vomit continued a longer or shorter time, according to the state of the pulse ; an increase of fulness of the pulse being attended with an abatement of the reaching, and the contrary.

In this state the patients were extremely unquiet, even their sleep being frequently attended with dejection of spirits and debility. This last symptom was so excessive

five that if the patient was only raised up in bed, or sometimes if the head was only raised from the pillow, while a little drink was given, the pulse sunk immediately, and became sometimes so small, that it could scarce be felt : they became cold, the skin became clammy, the delirium increased, their lips and skin, especially about the neck, face and extremities, as well as the nails, acquired a livid colour. The restlessness and tossing were so great, that it was sometimes scarce possible to keep the sick in bed, though, even in this state, they made no particular complaint, and if asked how they did, the reply was, *Very well.*

A yellowness in the eyes became now very observable, and this was soon diffused all over the body ; but in some, this colour did not appear until a little before death, when it spread surprisngly quick, especially about the breast and neck. Along with this were a number of small spots of a scarlet, purple or livid colour. These appeared principally about the neck and breast.

Some were obstinately constive, others the contrary, with large, liquid and black stools, but others were relieved by moderate stools, even though black. In some they resembled tar, in smoothness, tenacity, colour and consistence.

In this disease there was such a putrid dissolution of the blood that hæmorrhages took place from almost all parts of the body. In women the menstrua flowed, sometimes in great quantity, even at irregular periods. Blood flowed also from the eyes, nose, mouth and ears, and from those parts where blisters had been laid on. "Nay, (says our author) in the year 1739 or 1745, there were one or two instances of an hæmorrhage from the skin, without any apparent puncture, or any loss of the scarf-skin." The urine was pale while the patient was not yellow, but a deep saffron colour when the yellowness had come on. Sometimes it was turbid, at others bloody, and the quantity of blood was always in proportion to the state of the pulse ; diminishing as the pulse became more full, and increasing as it became weaker.

In the third stage, which always terminated in death, the pulse was exceedingly small and unequal, though soft; the extremities were cold, clammy and livid; the face and lips in some flushed, in others they were of a livid colour; the livid specks increased so fast, that in some the whole breast and neck appeared livid; the heart palpitated strongly; the heat about the præcordia was greatly increased, respiration became difficult, with frequent sighing; the patient became anxious and extremely restless, the sweat flowed from the face, neck and breast, blood from the mouth or nose or ears, and in some from all together; the deglutition became difficult, hiccup and subfultus tendinum came on, the patient picked the bed-clothes, was comatous or constantly delirious. In this terrible state some continued eight, ten or twelve hours before they died, even after they had been so long speechless, and without any perceptible pulsation of the arteries and wrists; whereas in all other acute diseases, death follows immediately after the pulse in the wrists ceases. When the disease was very acute, violent convulsions seized the unhappy patient, and quickly brought this stadium to its fatal end. After death the livid blotches increased fast, especially about the face, neck and breast, and the putrefaction began very early, or rather increased very quickly. In hot weather, and when the symptoms at first were very violent, there was little difference to be observed between the stadia, the whole tragedy being completed in less than forty-eight hours.

On this disease in general Dr. Lining remarks, that the infection was increased by warm, and lessened by cold, weather. In hot days the violence of the symptoms were augmented to such a degree as sometimes to become fatal to those who, in moderate weather, seemed to be in no danger; while, on the other hand, in cold days, some who had been in great danger were apparently saved from the jaws of death. The disease was also more fatal to those who lay in small chambers without a proper ventilation, to such as were of an athletic and full habit, to strangers, natives of a cold climate, and to such as were most afraid of it, as well as to those
who

who had previously overheated themselves by exercise in the sun, or by excessive drinking of strong liquors. It proved also most certainly fatal to valetudinarians, or to such as had been previously weakened by any disease.

Dr. Lind observes that “ a yellow colour of the skin “ is observed not only in common agues, but likewise “ in other fevers ; sometimes denoting, as in contagious “ fevers, their malignant nature, at other times, as in “ some West Indian fevers, an universal dissolution of “ the blood and humours ; and frequently this symptom “ accompanies gentle discharges of the bile, and a dis- “ eased liver.” In speaking of the diseases in the West Indies, he mentions some fevers, which he derives from stagnated air, “ of such a malignant nature, that the “ people after being there a few days are suddenly seized “ with violent vomitings, head-achs, deliriums, &c. and “ in two or three days more the whole body putrefies, “ and the dissolved mass of blood issues from every “ pore. . . . On considering the yellow fever particu- “ larly he is of opinion that the remarkable dissolution “ of the blood, together with the tendency to putrefac- “ tion in the whole body, the black vomit, and other “ characteristic symptoms, are often accidental though “ fatal appearances in fevers of the West Indies. They “ proceed, according to him, in such as are newly arrived, “ sometimes from a gross habit of body, excessive drink- “ ing of spiritous liquors, and from being afterwards “ overheated in the sun ; but the intense heat and un- “ healthfulness of the air does much more frequently “ produce all those symptoms. This fever was once “ supposed to have been first carried into the West In- “ dies by a ship from Siam : *an opinion truly chimerical ;* “ as similar diseases have made their appearance, not only “ in the East Indies, but in some of the southern parts of “ Europe, during a season when the air was intensely “ hot and unwholesome. This happened in the months “ of September and October 1764, when excessive heat “ and want of rain for some months gave rise to violent “ epidemic bilious diseases, resembling those of the West “ Indies, in the city of Cadiz in Spain, of which an
E e e “ hundred

“ hundred persons often died in a day. At this time
 “ the winds blew mostly from the south, and after sun-
 “ set there fell an unusual and very heavy dew. The
 “ disease began with alternate heats and chills, nausea,
 “ pains of the head, back and loins, and at the pit of the
 “ stomach. These symptoms were often followed, in
 “ less than 24 hours, with violent reachings, and a
 “ vomiting of green and yellow bile, the smell of which
 “ was very offensive. Some threw up an humour as
 “ black as ink, and died soon after, in violent convul-
 “ sions and in a cold sweat. The pulse was sometimes
 “ sunk, sometimes quick, but often varying. After the
 “ first day, the surface of the body was generally either
 “ cold, or dry and parched. The head-ach and stupor
 “ often ended in a furious delirium, which quickly
 “ proved fatal. The dead bodies having been examined
 “ by order of the court of Madrid, the stomach, mesen-
 “ tery and intestines were found covered with gangre-
 “ nous spots. The orifice of the stomach appeared to
 “ have been greatly affected, the spots upon it being
 “ ulcerated. The liver and lungs were both of a putrid
 “ colour and texture.

“ The stomach contained a quantity of an atrabilious
 “ liquor, which, when poured on the ground, produced
 “ a sensible effervescence; but, when mixed with spirit of
 “ vitriol, a violent ebullition ensued. The dead bodies
 “ turned so quickly putrid, that at the end of six hours their
 “ stench was intolerable, and in some of them worms
 “ were already found lodged in the stomach. His Ma-
 “ jesty’s ship the Tweed being at that time in Cadiz bay,
 “ several of her men were taken ill when on shore, but,
 “ by being carried on board, all of them recovered.
 “ Neither did the black vomit or any other deadly
 “ symptom of that fever make its appearance in any of
 “ the ships. The dread of this distemper forced many
 “ people of fashion to retire into the country, where they
 “ remained in perfect safety.”

Dr. Lind further remarks, that in the yellow fever it
 is a bad sign if the skin is very dry and rough; “ and the
 “ longer it continues in this state, the greater is the dan-
 “ ger,

“ger, as such patients seldom recover, though the pulse
 “may give hopes, and the other symptoms also be flat-
 “tering; for many have a good pulse in this fever a little
 “before death.” He also quotes Dr. Bruce, an eminent
 physician of Barbadoes, whose account of the disease is to
 the same purpose. He says it may come on at any
 season of the year, but that the symptoms are most
 severe when there is great heat joined with moisture.
 The blood, even in the beginning of the disease, is of
 a florid red colour, and as it were rarefied; the crassa-
 mentum scarcely cohering; the serum of a clay-co-
 loured yellow. It sometimes finishes its course in 24
 hours.

The account given by Dr. Hillary corresponds also
 very much with that already given. the subjects of the
 disease are the same with those already mentioned. He
 has seen it at all seasons of the year, but it is worst in a
 hot season, especially if it was preceded by moist and
 warm weather. “Blood, taken even at the beginning
 “of the disease, is often of an exceeding florid red colour,
 “much rarefied and thin, and without the least appear-
 “ance of sizziness; and the crassamentum, when it has
 “stood till it is cold, will scarce cohere, but fluctuates;
 “the serum is very yellow. . . . On the second or third
 “day the blood is much more dissolved, the serum
 “more yellow, and the crassamentum loose, scarcely
 “cohering, but undulates like fizy water when shaken,
 “and sometimes has dark, blackish spots on its surface,
 “showing a strong gangrenescent diathesis. . . . In the
 “latter stage of this fever the blood is so attenuated
 “and dissolved, that we frequently see it flowing not
 “only out of the nose and mouth, but from the eyes,
 “and even through the very pores of the skin; also
 “great quantities of black, half-baked, half-mortified
 “blood is frequently voided, both by vomiting and
 “stool, with great quantities of yellow and blackish pu-
 “trid bile, by the same ways; and the urine, which
 “was before of a high icteritious colour, is now almost
 “black, and is frequently mixed with a quantity of half-
 “dissolved blood. . . . Soon after death the body ap-
 “pears

“ pears much fuller of livid, large, blackish, mortified
 “ spots, particularly about the præcordia and hypocon-
 “ dres, especially the right ; which parts seem to be,
 “ even from the first seizure, the principal seat of this
 “ terrible disease. And upon opening the bodies of
 “ those who die of it, we generally find the gall-bladder
 “ and biliary ducts filled with a putrid blackish bile,
 “ and the liver and stomach, and adjoining parts, full of
 “ blackish and mortified spots, and sometimes gan-
 “ grenes, in those, as also in several other parts of the
 “ body. And the whole corpse soon putrefies after
 “ death, and can be kept but a few hours above
 “ ground.”

Dr. Jackson, in describing the yellow fever of Jama-
 ca, acknowledges the difficulty of characterising the dis-
 ease, even though he is of opinion that it “ possesses some
 “ characteristics of its own, different from those of any
 “ other.” In a note at the end of his work, he ob-
 serves the impropriety of calling it the *yellow* fever ;
 because that yellowness sometimes does not appear at all ;
 and in no one case does it ordinarily show itself till the
 latter stages. “ I know also (says he) that most of the
 “ practitioners of Jamaica consider it only as an aggra-
 “ vated species of the remittent, the common endemic
 “ of hot climates. It appeared to me, I must confess, in
 “ a different light. . . . It may not, however, be im-
 “ proper here to take notice of the opinion of Dr. Mose-
 “ ley, who has endeavoured to persuade us that it is no
 “ other than the *kausos*, or ardent fever, of the ancients.
 “ But the yellow fever of the West Indies is, by Dr.
 “ Moseley’s own confession, in some measure peculiar
 “ to strangers newly arrived in tropical climates. The
 “ *kausos*, we are informed, made its appearance in the
 “ islands of the Archipelago, and on the coasts of the
 “ contiguous continents, indiscriminately among men
 “ and women, natives and foreigners : in fact it has not,
 “ as far as I can perceive, any claim to be considered as a
 “ distinct disease. If I rightly understand Hippocrates,
 “ or the description of the still more accurate Aretæus,
 “ *kausos* in reality is only an accidental condition of the
 “ common

“common endemic of the country, where the force of
 “the fever is chiefly exerted upon the stomach and ali-
 “mentary canal. In this manner it appears frequently
 “in Jamaica, and in the southern provinces of America.
 “In the hot months of summer, it appears occasionally
 “in every climate ; and is not necessarily accompanied
 “with, nor does it depend upon, a general inflammatory
 “diathesis of the system for its existence.”

The Doctor divides this disease into three species :

1. Where “signs of putrefaction are evident at a very
 “early stage, which is generally rapid in its course, and
 “which casually terminates in black vomiting. Yel-
 “lowness seldom or never fails to make its appearance in
 “the present instance ; and perhaps it is the only one
 “which, strictly speaking, can be called the yellow fever.
 “2. A form of fever which has either no remissions, or
 “remissions which are scarcely perceptible ; in which
 “signs of nervous affection are more obvious than symp-
 “toms of putrescency ; and in which yellowness and black
 “vomiting are rare occurrences. 3. Another form, in
 “which regular paroxysms and remissions cannot be tra-
 “ced ; but in which there are marks of violent irritation,
 “and appearances of inflammatory diathesis in the ear-
 “lier stage, which give way, after a short continuance,
 “to signs of debility and putrescency, to which yellow-
 “ness frequently succeeds, or even sometimes the so
 “much dreaded vomiting of matter of a dark colour.
 “The disease in these three forms appears to be in reality
 “one and the same. The difference of the symptoms
 “probably arises from very trivial or very accidental
 “causes. It is in some measure peculiar to strangers
 “from colder regions soon after their arrival in the West
 “Indies, and may generally be distinguished from the com-
 “mon endemic of the country, not only by a total want of
 “paroxysms and remissions, but likewise by a certain ex-
 “pression of the eye and countenance, with something un-
 “usually disagreeable in the feelings, of which words
 “convey only an imperfect idea.”

The symptoms enumerated by Dr. Jackson are in
 general the same with those already taken notice of.

He

He mentions likewise a degree of confusion frequently joined with *grimness*, difficult to be described in words, but which a person acquainted with the appearances of the disease immediately recognises as one of its distinguishing marks. In the second stage he says, that no sweat or moisture was now observable on any part of the body : the state of the skin impressed the idea as if it were not pervious to any degree of perspiration, and heat gradually forsook the surface and extremities : the tongue became moist, and at the same time frequently clean about the edges : the gums became redder, more spongy, and showed a greater disposition to bleed : vomiting was troublesome : the matter thrown up was ropy, in large quantity, and abounding with villous or mucous flakes of a darker colour. The circulation in the extreme vessels became gradually more languid ; the natural heat retired from the surface of the body, which was now dry and impervious ; the pulse returned nearly to its ordinary state, or became slow, full and regular ; the yellowness increased fast, so that the whole body was frequently yellow as an orange, or of as deep a colour as the skin of an American savage : anxiety was inexpressible ; vomiting was irrestrainable, and the vomiting of a matter like the grounds of coffee at last made its appearance. This matter was often as black as foot, where the progress of the disease had been rapid ; while it was not only less intensely black, but often tinged with green, where the disease had been more slow and gradual. The number of villous or mucous flakes, in the matter discharged by vomit, increased as the disease advanced, and with them were joined streaks of blood, which seemed principally to come from the throat and gums. As the disease advanced, the vomiting became more frequent, but was seldom accompanied with any violent retching. Quantities of liquor were discharged, so enormous that it was often difficult to imagine whence they came ; after which the patient enjoyed some respite, till a similar collection was made. As soon as the matter discharged by vomit acquired this dark and sooty colour, the belly generally became loose, the stools being black, smooth, and not
unlike

unlike tar or molasses; the tongue became clean, the gums putrid; hæmorrhages, or rather *oozings of blood*, were sometimes observed in different parts of the body, while livid blotches made their appearance on the belly and insides of the thighs. The pulse, which during the latter stages of the distemper could scarcely be distinguished from that of a person in health, became at last irregular, quick, or intermitting; soon after which coma or convulsions closed the scene. Sometimes the yellowness succeeded the black vomiting. In these the vomiting began unexpectedly, or without much previous affection of the stomach: the colour was commonly intensely black; the patient turned yellow almost in an instant, and died in a very short time. When any one recovered from this deplorable situation, of which there were some few instances, the termination was not by any regular crisis. The black vomiting ceased, sometimes apparently in consequence of treatment, sometimes evidently of its own accord: but a vomiting of a ropy, glutinous matter continued for a great length of time, together with an extreme irritability of the stomach, and a very peculiar state of the skin; which sometimes did not recover its natural smoothness and unctuousity for several weeks.

The disposition to faint, so common in the yellow fever, is supposed by Dr. Jackson to arise from a kind of torpor in the nervous system, rather than the usual causes of fainting. For this opinion he assigns as a reason, that "the patient was often able to stand upright for some time, and even to walk to a considerable distance; and, when at last overcome, was observed to fall down in a torpid, rather than a fainting, state."

In dissections our author observed that the omentum and all its appendages were in a dry and parched state, and of an uncommon dark grey colour. But, along with this dark grey colour, and want of unctuousity and moisture, usually met with in the abdomen, the stomach and intestines had a dirty yellow appearance, were highly putrefied, and much distended with wind. The liver and spleen were generally enlarged in size; the former
of

of a deeper yellow than any of the other abdominal viscera; while the texture of the spleen was often less firm than natural. The bile was usually black and thick, like tar or molasses; the blood-vessels of the liver bearing marks of uncommon distension. A quantity of black fluid, similar to that ejected by vomit, was found in the stomach, which fluid our author says positively derived its blackness from the bile, the flakes observed to float in it being parts of the villous coat of the stomach abraded. He denies that the black colour of the matter vomited is owing to blood, as many authors have supposed. He says that the passage of the bile might be easily traced from the gall-duct into the pylorus.

This being in the Doctor's opinion the only true kind of yellow fever, we shall not follow him through the description of the other two species, but proceed to consider that remarkable and excessively fatal distemper which appeared in the year 1793, first in the West India islands, and then on the American continent. Dr. Chisholm, who has described the distemper very particularly, derives it from the coast of Africa, and gives the following account of its origin on the authority of a Mr. J. Paiba, "one of the adventurers in the Boullam
 " scheme; and who, despairing of success, left the coast
 " of Africa in a vessel called the *Hankey*. This vessel
 " sailed from England in April 1792 with stores and
 " adventurers for the intended colony at Boullam. The
 " people were all in good health: that part of the coast
 " of Africa on which they touched is remarkable for its
 " healthiness; only it is destitute of water except what
 " can be procured by digging temporary wells on the
 " beach, and which is brackish, and consequently un-
 " wholesome. The ferocity of the negroes who inhabit
 " that part of the continent prevented them from being
 " accommodated on shore, so that they found themselves
 " obliged to remain on board the *Hankey* for nine
 " months. As the rainy season came on almost imme-
 " diately after their arrival on the African coast, they
 " attempted to shelter themselves by raising the sides of
 " the vessel several feet, and covering it with a wooden
 " roof.

“roof.” Thus were upwards of two hundred persons, among whom were many women and children, confined in such a manner as must be supposed capable of producing fevers of a bad kind, if they could be produced by such causes. Accordingly a malignant fever did break out; the vessel was not ventilated, nor were the bed-clothes, &c. of the sick destroyed; from whence Dr. Chisholm concludes that the infection remained on board the vessel. The Doctor then proceeds to give the following account of the vessel after her departure from Boullam :* “Capt. Coxe, finding the water at “Boullam unwholesome, proceeded with his ship to “Bissão, where there is a Portuguese settlement, for a “supply. The ship was navigated by about twelve seamen, most of whom had not experienced sickness, and “had probably been procured from Sierra Leone: at “any rate they were then taken on board for the first “time. Of these, before the return of the Hankey to “Boullam, nine died; and the remainder, with the “captain, were reduced to a deplorable state. The “time for which the Hankey was chartered being expired, Mr. Paiba, with his family, intended to return “to England in her; but as no seamen could be procured they put to sea, having on board the captain, sick, “and only the mate, Mr. Paiba and two seamen to navigate the ship. With much difficulty they arrived at “St. Jago, where they fortunately found the Charon “and Scorpion ships of war. Capt. Dodd of the former, humanely rendered them every service in his “power, and on leaving them put two men of each ship “on board the Hankey. With this aid they proceeded “to the West Indies; a voyage to England being “impracticable in their wretched state. On the third “day after leaving St. Jago, the men they procured “from the ships of war were seized with the fever, which “had carried off three fourths of those on board the “Hankey at Boullam; and, having no assistance, two “of the four died: the remaining two were put on “board

* Chisholm's Essay on the Malignant Pestilential Fever, p. 86.

“ board here in the most wretched state possible. Capt.
 “ Dodd, on his arrival at Barbadoes from the coast of Afri-
 “ ca, was ordered to convoy the homeward-bound fleet of
 “ merchantmen. In the execution of his orders he came to
 “ Grenada on the 27th of May, and, hearing of the
 “ mischief which the Hankey had been the cause of,
 “ mentioned that several of the Charon’s and Scorpion’s
 “ people were sent on board the Hankey at St. Jago, to
 “ repair her rigging, &c. that from this circumstance,
 “ and the communication which his barge’s crew had
 “ with that ship, the pestilence was brought on board
 “ both ships; and that of the Charon’s crew thirty
 “ died, and of the Scorpion’s, about fifteen. The Han-
 “ key arrived at the port of St. George’s (in Grenada) on
 “ the 19th of February, in the most distressed situation,
 “ and for a few days lay in the bay, but was afterwards
 “ brought into the carenage. From this period are we
 “ to date the commencement of a disease before, I be-
 “ lieve, unknown in this country, and certainly un-
 “ equalled in its destructive nature.”

This account of the introduction of the fever (which
 however is by Dr. Chisholm accounted very different
 from the yellow fever above described) is so clear and
 distinct, that, at first reading, it commands our belief.
 It hath not, however, met with universal approbation;
 and even the *facts*, for which both parties appeal to Mr.
 Paiba and capt. Dodd, vary from one another in a sur-
 prising manner. Dr. Trotter, in his *Medicina Nautica*,
 v. 328, gives the following account: “ Dr. Chisholm
 “ tells us, that the ships of war on the African station,
 “ having sent men to assist the Hankey, after numbers
 “ had perished from the fever, received the infection by
 “ means of this communication, and that in the Charon
 “ thirty died, and fifteen in the Scorpion. Capt. Dodd,
 “ who at that time had his broad pendant in the Cha-
 “ ron, now commands the Atlas of 98 guns in the fleet;
 “ Mr. Smithers, the surgeon, is at present in the For-
 “ midable, a second rate, also in the fleet; *from them* I
 “ have copied the following narrative of their transac-
 “ tions with the Hankey:

“ When

“ When the squadron under commodore Dodd
 “ came to St. Jago in 1793, the Hankey lay there in
 “ great distress for want of hands; having buried above
 “ one hundred persons, men, women and children, from
 “ the time she had been at Bulam. *The fever was now*
 “ *overcome* : Mr. Smithers saw two men that had lately
 “ recovered. He left a quantity of bark. The Charon
 “ and Scorpion sent two men each to assist in navigating
 “ her to the West Indies. The Hankey at this port
 “ was cleaned, washed with vinegar, and fumigated. *No*
 “ *fever appeared in either of the men of war*, in conse-
 “ quence of this communication ; they arrived at Gre-
 “ nada in perfect health, but did not go into the same
 “ part of the island to which the Hankey went. The
 “ Charon, at this harbour received some seamen from
 “ the merchant ships then taking in cargoes for England ;
 “ she had afterwards *fourteen* cases of yellow fever, of
 “ which one died : but it is remarkable that the Scor-
 “ pion did not bury a single man during the whole voy-
 “ age.* It is probable from these facts, that the Han-
 “ key *did not* import the infection that produced the
 “ Grenada fever ; for, *after the disease was worn out*, she
 “ had a passage to make to the West Indies of many
 “ hundred leagues. It is also doubtful how the effects
 “ left in the Hankey could produce the fever, for *the*
 “ *bedding was thrown away*, and what clothing remained
 “ had been aired, and probably had scarcely been in
 “ contact with the body after being sick.”

The discordance between this and the foregoing ac-
 count is abundantly evident. Dr. Chisholm's account
 of the bedding, &c. is also very different. “ Our lieu-
 “ tenant governor, Ninian Home, esq. some time after
 “ the disease became epidemic, informed me, that, in
 “ consequence of the information he had received of
 “ the clothes, &c. of the victims of the fever at Boul-
 “ lam being still on board the Hankey, he ordered Capt.
 “ Coxe to be brought before him and some gentlemen
 “ of the council. He then acknowledged, that *all the*
 “ *effects* of those who had died were then on board his
 “ ship,

* To this is subjoined the attestation of Mr. Smithers with respect to the Charon;

“ ship, and said that he *would not* destroy them, unless
 “ he was indemnified for the loss he might sustain,
 “ should the heirs of the deceased call on him for those
 “ effects. Every argument was used to induce him to
 “ destroy the articles, but the only one which influences
 “ a man of this description, *indemnification*; and he of
 “ course carried the seminum of the disease to England.”
 It was this consideration which induced the governor to
 write to the secretary of state, and in consequence of his
 representation the vessel was obliged to perform quaran-
 tine in England, a circumstance which Dr. Trotter
 mentions without approbation.

Thus far the matter of *fact* seems to be very much
 obscured; and the more we investigate, the more we are
 involved in darkness. In the Medical Repository, vol. i,
 p. 484, we find the following severe censure passed upon
 Dr. Chisholm by the late Dr. Smith of New York:
 “ It belongs to another part of this paper to assign the
 “ probable motives of Dr. Chisholm for maintaining
 “ that the fever was imported into Grenada: certain it
 “ is that he avowed a different opinion to Mr. Paiba, to
 “ whom he freely declared, that he could by no means
 “ trace the disease to the *Hankey*; and that he believed
 “ it to be of local origin, owing to the unhealthy condi-
 “ tion of the carenage, and the particular prevailing
 “ winds: and, to confirm this notion, he informed
 “ Mr. Paiba that a similar disease, from the same cause,
 “ though in a less degree, had existed in St. George’s
 “ some years before.”

This was plainly giving Dr. Chisholm *the lie*; which,
 whatever might have been the consequence between the
 two parties, absolutely supercedes, to any impartial and
 unconcerned person, the evidence of *both*, at least as far
 as regards the origin of this disease. It is not, however,
 to be supposed that Dr. Chisholm would pass such a cen-
 sure unnoticed. He did accordingly reply in a letter to
 Dr. Smith, who had sent him a copy of the Repository,
 with a letter inviting him to defend what he had said.
 Dr. Smith died before this letter reached him, but the
 principal part has appeared in the Medical Repository,
 vol.

vol. ii, p. 285. In this Dr. Chisholm retracts what he had said concerning the mortality on board the Charon and Scorpion ships of war. "I have lately received" (says he) from a gentleman of the navy here, a log-book of the Charon, kept by one of her officers during the voyage in question. In this I find, that no sickness took place in either of these ships in consequence of this interview. A log-book is unquestionable evidence, and I therefore admit it." As to the more serious part of the charge, viz. that Dr. Chisholm had wilfully misrepresented matters, the Doctor replies, that the narrative published by him was in general such as he had from Mr. Paiba; not indeed in manuscript, as Dr. Smith stated his to have been, but in conversation; and that this conversation took place expressly with a view to elucidate the cause of the fever, which he (Dr Chisholm) could not account for by any reasoning from local causes, but heard it very generally ascribed to infection from the Hankey. Mr. Paiba was introduced to Dr Chisholm at the request of the latter by the Hon. Samuel Mitchill *now* (the letter is dated Sept. 6th 1768 probably 1798) the senior member of the council of Grenada. "Mr. Mitchill (says the Doctor) brought Mr. Paiba to my house, and was present during the greatest part of the time the conversation continued, I found Mr. Paiba very willing to give me every information in his power relative to the state of the Boulama or Boulam colony, and of the ship Hankey; but I found him strongly disinclined to fall in with the universally received opinion, that that ship introduced the disease. The particulars I have given, are those Mr. Paiba related to me in this conversation; and, in order to be correct, I immediately, after Mr. Paiba left me, committed them to paper. Mr. Paiba promised to favour me with a written account; and in order to direct that gentleman's attention to the points I considered as of most importance, I drew up a set of queries, and Mr. Mitchill charged himself with the delivery of it. A copy of these I have now in my possession, and a slight attention will exhibit my view

" in

“ in framing them, and show the doubts respecting the
 “ nature of the epidemic which suggested them. Al-
 “ though I repeatedly, through Mr. Mitchell and Mr.
 “ Palmer, the gentlemen with whom Mr. Paiba resided
 “ in the country, renewed my request to have this pro-
 “ mise fulfilled, Mr. Paiba left the Island without gra-
 “ tifying it. If no other strong proof existed of some-
 “ thing peculiar in the fever which at that time prevail-
 “ ed, the circumstance of my formally applying to Mr.
 “ Paiba for information relative to the state of the
 “ Hankey, and of taking the trouble to obtain an inter-
 “ view with him, presents an evidence as conclusive as
 “ can well be required by reasonable men. But the be-
 “ lief of the infection of the Hankey was *universal*, nor
 “ was it by any means confined to those whose interest
 “ might have been affected by the prosperity of an in-
 “ fant colony on the coast of Africa.”

Another charge against Dr. Chisholm is, that he falsi-
 fies the date of the Hankey's arrival at Grenada; and
 which in Dr Smith's paper is brought forward in the fol-
 lowing words: “ In p. 91 the Doctor remarks, that, ‘ in
 “ the short space of time from the beginning of March
 “ to the end of May, 200 of about 500 sailors, who
 “ manned the ships in the regular trade, died of this
 “ fever.’ By this it appears that the fever in question
 “ broke out as early as the beginning of March. The
 “ dissingenuousness of this author is particularly evident
 “ from this quotation, if the period of the commence-
 “ ment of the disease be correctly assigned: and that it
 “ is so is probable from the difficulty of concealing the
 “ fact; as there must have been thousands of witnesses
 “ to the progress of the fever. When therefore it was
 “ thought proper to fix the odium of introducing the
 “ disease upon the Hankey (a project of which Dr.
 “ Chisholm seems originally to have had no idea) it be-
 “ came necessary for him to fix an earlier date to her
 “ arrival. Now, that the Hankey did not arrive till
 “ towards the latter end of March, is verified by the
 “ concurring testimony of Mr. and Mrs. Paiba, and of
 “ Mr. Bell, of this city (New York) who happened to
 “ be

“be in Grenada about that time, and was personally acquainted with Mr. and Mrs. Paiba in that island.”

In answer to this Dr. Chisholm repeats his declaration that the Hankey arrived at Grenada on the 18th of *February*, and not on the 19th of March, as Dr. Smith (supposed on the authority of Mr. Paiba) had stated. In proof of this he produces an incontestible evidence, viz. an extract from the St. George's Gazette in Grenada, of date 19th of February, which begins thus: “By the ship Hankey of London, arrived here *yesterday* from the island of Boulam on the coast of Africa, we are informed,” &c. The remainder of the extract contains an account of the excessive mortality on board the ships; which, as it may perhaps be exaggerated, it is needless to transcribe.

The next thing of consequence is the destruction of the bed-clothes and effects of the deceased; of which Dr. Smith says, “Before the Hankey put to sea, all the bedding of the sick was thrown overboard or destroyed; the ship was washed from stem to stern, both above and below, with salt water; and the purification was completed by fumigating her with tar, pitch and gun-powder. In this clean condition they bade farewell to Bulama on the 22d of November, 1792; but, in attempting to pass through the channel near to the entrance into the open sea, in a dark and foggy night, they got aground on a sand-bank, upon the north side of the island of Formosa or Warang, belonging to the Bijugas, who are represented as cannibals. The extreme terror excited by this accident was not calculated to improve the health of the people on board the Hankey; so that, when it became necessary to take measures for their security and deliverance, only four men were found in a condition to do duty, and all of these had intermittents. With them, however, and his lady, Mr. Paiba set off, in an open boat, for Bissao, to obtain assistance from the Portuguese settlement. Thither he arrived, rowing though rains and fogs, in a leaky boat, after being out
“two

“ two nights and a day ; and having obtained such help
 “ as he could, returned to the Hankey, got her off, and
 “ carried her to Bissao. On the passage there *eight* per-
 “ sons died who belonged to this ship. At Bissao they
 “ refitted, and the Hankey *was a second time purified as*
 “ *completely as she had been before leaving Bulama.*”

In answer to all this Dr. Chisholm *again declares*, “ that
 “ the bedding and effects of the deceased *were preserved*
 “ on board the Hankey, and constituted the seminum
 “ of the infection. Capt. William Liddle, of the ship
 “ General Mathew, saw them on board ; and it was in
 “ consequence of that gentleman’s representation that
 “ the lieutenant governor, Mr. Home, entered into a
 “ strict investigation of the matter ; the general result of
 “ which I have given ; and the authenticity of it may be
 “ depended on. Capt. Liddle is now resident in Lon-
 “ don, and Mr. Byles, the governor’s secretary, is now
 “ resident commissary at Grenada ; and these gentlemen
 “ will readily testify to the truth of my statement. The
 “ destructive articles I have mentioned *were not thrown*
 “ *overboard* till the Hankey arrived in Grenville Bay,
 “ when they were destroyed at the request of Mr. Prend-
 “ foot, the gentleman who chartered the ship for Eng-
 “ land.

Dr. Chisholm is likewise charged with having mis-
 stated the case of a Capt. Remington, said to be the first
 who suffered by the fever in Grenada. The words in
 Dr. Chisholm’s Essay are, “ A Capt. Remington, an in-
 “ timiate acquaintance of Capt. Coxe’s, was the first per-
 “ son who visited the Hankey after her arrival in St.
 “ George’s bay. This person went on board of her in the
 “ evening after she anchored, and remained three days ;
 “ at the end of which time he left St. George’s, and pro-
 “ ceeded in a drogher (a coasting vessel) to Grenville
 “ bay, where his ship, the Adventure lay. He was seiz-
 “ ed with the malignant pestilential fever on the passage ;
 “ and the violence of the symptoms increased so rapidly,
 “ as, on the third day, to put an end to his existence.”
 In opposition to this Dr. Smith gives the following state-
 ment from Mr. Paiba : “ He (Capt. Remington) had
 “ been

“been all day and all night coming from Grenville bay, and had been wet through. He slept on board in his clothes ; and went in an open boat *the next day* back to his ship : enough to kill any one in that climate.” Dr. Chisholm replies “ that the above statement is not correct, nor founded on fact ; Dr. Chisholm’s evidence for what he said was founded on the information of captains of vessels, who knew all the circumstances of his visit to the Hankey ; and of Dr. Stewart, an eminent practitioner, who attended him at Grenville bay, when he landed there. Lastly, that the idea of his having returned to Grenville bay in an open boat, is absurd ; nothing of the kind having been ever attempted.”

From this tedious account it is plain that the evidence relative to the importation of the fever into Grenada by the Hankey is quite contradictory, and subversive of itself, because we are unable to judge between the two disputants. A further consideration of it would lead us entirely from the subject of this treatise, into an endless dispute about which of the two parties had spoken the truth. Setting aside therefore *the whole* of the evidence on both sides as insufficient, we shall now proceed to give an account of the symptoms of the distemper as described by Dr. Chisholm, and to which description there has never been any objection made.

In the most violent kind of this fever, according to our author, “ the patient, without any previous complaint, suddenly becomes giddy ; he loses his eye-sight ; every thing seems to move round him with inconceivable velocity ; he falls down almost insensible, and in that state remains near half an hour, or upwards. During this paroxysm the body feels cold, and is overspread with cold sweat, which issues from every pore in astonishing abundance. On his recovery the cold goes off, and is instantly succeeded by intense heat, and quick, small, hard pulse ; the head aches dreadfully, particularly the fore part ; generally accompanied with pain in the right side and at the præcordia. The last, however, has never been acute, and may rather be cal-

“ led oppression than pain. The eyes are much inflamed;
 “ watery, protruded, and wildly rolling ; the face much
 “ flushed ; much heat is felt at the pit of the stomach,
 “ and that organ seems to be considerably affected by
 “ the frequent retching and vomiting which then come
 “ on. The patient soon after complains of intolerable
 “ pains in the small of his back and in the calves of his
 “ legs ; but the latter appears to be most violent. Dur-
 “ ing twelve, eighteen, twenty-four or thirty-six hours,
 “ these symptoms continue increasing, except the quick-
 “ ness and hardness of the pulse, which does not change
 “ materially during that time ; and are then succeeded
 “ by general coldness, cold sweat, a greater or less degree
 “ of coma and delirium, or a state very much resembling
 “ intoxication. Life in this state is lengthened out to
 “ sixty or ninety hours from the first attack. A short in-
 “ terval of reason then takes place ; the patient considers
 “ himself better, and is, for a moment, flattered with the
 “ prospect of recovery : but a fit as sudden and unex-
 “ pected as the first comes on, during which he foams
 “ at the mouth, rolls his eyes dreadfully, and throws
 “ out and pulls back his extremities in quick succession.
 “ In general the patient expires in this fit ; but some
 “ have recovered from it, and continued rational for a
 “ few hours longer, when a second fit has carried them
 “ off.”

This, without much deviation, was the general pro-
 gress of the worst kind of the fever. In some, however,
 a comatose disposition showed itself from the very first ;
 in others the disease began with short convulsive fits in
 frequent succession, followed by constant delirium and
 cold clammy sweat, without any intervening heat. In
 a few cases the first symptoms were coldness and shiver-
 ing, as in other fevers.

The distinguishing symptoms were the uncommonly
 sudden attack, the remarkably acute pain in the loins and
 calves of the legs, the watery, inflamed and rolling eye,
 flushing of the face, tendency to coma, the pain general-
 ly confined to the forehead, and the peculiar cast of the
 delirium, during which the looks and actions of the pa-
 tient

tient very much resembled those of a person intoxicated. It was never furious in any other way than by making efforts to get out of bed ; and these in a few instances rose so high that the patients got up, dressed themselves, and walked out a considerable way before they could be overpowered. " The strength during the delirium is " to appearance surprisingly great, for it is frequently " necessary to use the united efforts of two or three men " to keep the patient in bed. This is, however, no more " than a spasmodic affection of the muscles ; for in reality the powers of the sick in this disease are reduced " to the extreme of debility, as is seen in the convalescent state."

The most unequivocal characteristic of this disease, however, according to our author, is the appearance of a kind of petechiæ, but which look rather like red or livid patches than what is commonly understood by that word. They were *always* the forerunners of death. In a few very violent cases the body was almost of a livid or black colour, but they were generally seated on the neck, shoulders and breast. *Vibices* also, like those in the plague, described p. 258, sometimes made their appearance, and were also a fatal presage.

Hæmorrhage occurred much more frequent and profuse in this than in any other acute distemper our author had met with. " In several instances, the immensity of " blood discharged has evidently been the more immediate cause of death. The robust, plethoric and gross " habits have been the most subject to it. It has taken " place from the nostrils, mouth, anus, and urethra ; " sometimes from the canthi (corners) of the eyes ; but " never, I believe, from the ears or pores of the skin. " The most profuse discharge has been from the nostrils " and anus, and has frequently, amounted to three or " four pounds at a time ; the stools having been on those " occasions entirely composed of pure blood. Towards " the close of life, the blood thus discharged has appeared " granulous, or like ichor, with a sediment of a black " gritty substance, and has been so extremely offensive " as to oblige all the attendants to keep at a considerable " distance

“ distance till the hæmorrhage ceased. Hæmorrhage,
 “ however, has never been critical, nor has it in any
 “ instance permanently relieved the head-ach or pain in
 “ the breast or side. . . . Nearly about the period that
 “ these profuse discharges came on, a rawness was felt on
 “ the whole of the interior surface of the nose, and on
 “ several parts of it little ulcers formed; on others,
 “ small eschars, which were remarkably itchy, but on
 “ being touched, or an attempt made to detach them
 “ from the membrane of the nose, were very painful, and
 “ bled. These disappeared in proportion to the patient’s
 “ recovery; and I have reason to suspect, that, when
 “ the issue of the disease was fatal, these little eschars
 “ became gangrenous.”

In this distemper there was always a tendency to coma after the first two days; and after the third, it certainly came on. On examining the heads of two who died convulsed after having been comatose for some time, a great quantity of serum was found in the brain; and, on narrowly inspecting the eyes of those who were afterwards seized with coma, the pupil was found manifestly dilated.

A remarkable symptom unnoticed in any other fever is taken notice of by our author; viz. an affection of the testicles. “ About the end of the second day the patient began to complain of a violent pain in these parts,
 “ accompanied with a contraction of the spermatic cord,
 “ and a drawing up of the testicles towards the abdominal ring. On examination they appear very much
 “ lessened in size, are drawn up considerably towards the
 “ abdomen, and the scrotum appears at the same time
 “ remarkably flaccid and empty. The surface of the
 “ scrotum becomes soon after very painful, and an excoriation takes place, chiefly at the most descending
 “ part, from which a considerable quantity of very offensive purulent matter issues: at the same time a similar
 “ discharge from the urethra takes place, which ceases
 “ with the disease when the event is favourable, or becomes ichorous and bloody, and insufferably foetid
 “ when death is the consequence. In cases which terminate

“minate favourably, the whole of the scrotum, in a few days, is covered with a crust of hardened pus, which, in the convalescent state, comes away very easily by means of a warm bath. The thickness of this coat may be about the fourth of a line; and, when separated, it much resembles moistened parchment. In fatal cases, this affection of the scrotum always terminates in gangrene a few hours before death.”

Another remarkable symptom is the change of voice to a shrill, soft and low sound when compared with the natural tone, at the same time that the syllables are more distinguished, and the words are strangely lengthened out in a drawling and whining manner. This change of voice affords a pretty certain prognostic; every alteration towards the natural tone being an almost certain sign of a favourable change, and the contrary if the voice becomes farther removed from it.

The pains felt in this fever were in a great measure peculiar to it, and seem to have been of a spasmodic nature. In the head the pain shot from the forehead, to which it was confined, invariably towards the bottom of the orbits, where it was generally exquisite. Sometimes it extended to the temples, where there was always a throbbing; but in no case did it extend to the back part, or over the whole head. This pain extended also to the balls of the eyes, which were protruded, and seemed ready to start from their orbits, with an inflammation externally, and a sensation of pain internally, rendering the admission of light intolerable. In the legs the pain had its seat at the top of the great tendon, immediately below the calf, and in the point where it was seated a gnawing sensation was felt, occasioning exquisite torture, with an involuntary contraction of the limb; so that, on the whole, our author concludes that this pain much resembles the cramp, differing only in being more permanent.

With regard to the pulse, our author observes, that in this disease “it never intermits. Even at the approach of death it has not intermitted, but has generally been remarkably tremulous, and so slow as to
“beat

“beat no more than thirty times in a minute. On the whole, it has not been found quicker than 130, or slower than 30, in a minute.” In violent cases the pulse was hard, quick and small, but sometimes full; and when it was so it was a good sign. It was however subject to excessive variations; and it frequently happened, “especially in the robust, that, after the first stage, flushing and chillness have often alternated in less than a minute; and that, although the skin felt considerably warm, the pulse has been no more than 52; but that, even when the low state came on, in which there was always a disagreeable coldness of the surface, it has been as quick, and nearly as full, as during the preceding febrile stage, although unaccompanied with thirst, or any other evident symptom of the existence of fever.”

In the state of delirium, Dr. Chisholm observes, that, whatever was the subject of the patient's raving thoughts, he was always strongly under the impression of fear; and a word from the physician always reduced him to implicit obedience, however restless he might have been before. During this state he complained of no pain, even from blisters, nor was he sensible of the operation of laxative medicines. On being asked about his situation, he always answered that he was very well, and sensible of no pain, as in the yellow fever already described. It is observable, however, that the yellow colour, so remarkable in the former, seldom took place in the Boulam fever; but indeed this symptom, as has formerly been noticed, is by no means a characteristic either of the one disease or the other; but Dr. Chisholm observes “that in some protracted cases on shore, and in some among the sailors, which might have been a combination of the pestilential and yellow fevers, this symptom appeared about the 5th, 7th or 9th day.”

Besides the petechiæ and vibices, already mentioned, Dr. Chisholm takes notice of two other sorts of eruptions, which appeared about the lips: the one was such as frequently appears at the termination of the common remittents, and was favourable; the other resembling spots

spots made by the fine black pencil of a painter, all round the mouth, but especially the upper lip, and certainly affording a fatal prognostic.

This disease was attended with a suppression of urine, a violent pain above the os pubis, a scalding in the urethra, a sense of fulness, without any visible swelling, a contraction and distortion of the penis; the urine generally of a deep red, sometimes brownish, green, very often bloody, and in a few cases much inclining to black, and of an oily consistence. Its smell was generally very offensive. All the excretions were exceedingly offensive, but the fæces most remarkably so towards the latter end of the disease; for in the beginning they had no remarkable factor. The sick were almost universally costive, which our author supposes to have arisen from a suspension of tone in the intestinal canal; for by exciting action in the fibres a large evacuation generally ensued. The colour of the fæces varied from yellow, or a yellowish white, to black; and from a considerable degree of thickness, to the exact appearance of coffee-grounds. The matter discharged by vomit also varied from porraceous to black, and resembling coffee badly boiled.

In this disease, as in the plague described by Thucydides, most other diseases degenerated into it, or partook of its nature. Dysenteries suddenly stopped, and were immediately succeeded by the symptoms of pestilential fever. A remarkable instance of this is given in twenty-seven recruits, who had been seized with dysentery, in consequence of being exposed to rain, receiving the infection in the hospital to which they were carried. The medicines exhibited with a view to cure the dysentery seemed to be attended with surprising effect; but in a short time symptoms of pestilential fever came on, even in a few hours after those of dysentery had disappeared. In like manner catarrhal complaints soon changed their nature. Convalescents from other diseases, such as laboured under chronical complaints, particularly rheumatism and inflammation of the liver, were particularly subject to it. “ The puerperal fever became malignant,
“ and

“and of course fatal; and even among pregnant negro women, who might otherwise have had it in the usual mild degree peculiar to that description of people, many were reduced to a very dangerous situation by it. In short, every disease in which the patient was liable to infection, sooner or later assumed the appearance, and acquired the danger, of the pestilential fever.”

This fever was said to be propagated from Grenada to others of the West India islands, and to the United States, where in the same year, 1793, it raged with great violence in Philadelphia. Without entering into any inquiry at present concerning the truth of this report, or the origin of the fever itself, let us see whether from the symptoms enumerated by Dr. Rush, who hath written a very lengthy dissertation upon the disease, it was the same with the Boulam fever already described. According to him the fever in 1793 was frequently preceded by costiveness, a dull pain in the right side, defect of appetite, flatulence, perverted taste, heat in the stomach, giddiness or pain in the head, a dull, watery, brilliant, yellow or red eye, dim and imperfect vision, hoarseness, or slight sore throat, low spirits, or unusual vivacity, a moisture on the hands, a disposition to sweat at nights, or after moderate exercise, or a sudden suppression of night sweats. . . . On entering a sick room the physician was first struck by the countenance of the patient. It was as much unlike that which is exhibited in the common bilious fever, as the face of a wild animal is unlike that of a domestic one. The eyes were sad, watery, and so inflamed in some cases as to resemble two balls of fire. Sometimes they had a most brilliant or ferocious appearance. The face was suffused with blood, or of a dusky colour, and the whole countenance was dusky and clouded. After the 10th of September, when the determination of blood to the brain became universal, there was a preternatural dilation of the pupil. Sighing attended in almost every case. The skin was dry, and frequently of its natural temperature. . . . The pulse at the beginning of the attack was sometimes full, tense and quick,

" quick, but frequently weak ; sometimes so low that
 " it could not be perceived without pressing the wrists ;
 " and sometimes it had no preternatural quickness. In
 " many it intermitted after the fourth or fifth, and some-
 " times after the fourteenth stroke. In some it was ex-
 " tremely slow ; even as low as thirty strokes in a mi-
 " nute. The pulse was also *tense* and *chorded*. The
 " slow intermitting pulse was observed more frequently
 " in children than adults, and supposed to proceed from
 " a collection of water in the brain. Impressed with
 " this idea, I requested Mr. Coxe, one of my pupils, to
 " assist me in examining the state of the eye. For two
 " days we discovered no change in it ; but on the third
 " day after we began to inspect the eyes, we both per-
 " ceived a preternatural dilatation of the pupils in different
 " patients ; and we seldom afterwards saw an eye in
 " which it was wanting. In Dr. Say it was attended
 " with squinting, a symptom which marks a high de-
 " gree of a morbid affection of the brain. Had this
 " slowness or intermission of the pulse occurred only af-
 " ter signs of inflammation or congestion had appeared
 " in the brain, I should have supposed that it had been
 " derived wholly from that cause ; but I well recollect
 " having felt it several days before I could discover the
 " least change in the pupil of the eye. I am forced
 " therefore to call in the operation of another cause, to
 " assist in accounting for this state of the pulse, and this
 " I take to be a spasmodic affection, accompanied with
 " preternatural dilatation or contraction of the heart.
 " Lieutaud mentions this species of pulse in several pla-
 " ces, as occurring with an undue enlargement of this
 " muscle. Dr. Ferriar describes a case, in which a low,
 " irregular, intermitting and hardly perceptible pulse
 " attended a morbid dilatation of the heart. . . .
 " After the 10th of September this undescribable or *fulky*
 " pulse became less observable, and, in proportion as
 " the weather cooled, it disappeared. It was gradually
 " succeeded by a pulse full, tense, quick, and as frequent
 " as in pleurisy or rheumatism. It differed, however,
 " from a pleuritic or rheumatic pulse, in imparting a
 " very

“ very different sensation to the fingers. No two strokes
 “ seemed to be exactly alike. Its action was of a hob-
 “ bling nature. . . . It was an alarming symptom. . . .
 “ The pulse most frequently lessened in its fulness, and
 “ became gradually weak, frequent and imperceptible
 “ before death ; but I met with several cases in which it
 “ was full, active, and even tense, in the last hours of
 “ life.

“ Hæmorrhages occurred in the beginning of the
 “ disorder, chiefly from the nose and uterus. Sometimes
 “ only a few drops of blood distilled from the nose. As
 “ the disease advanced, the discharges of blood became
 “ universal. They occurred from the gums, ears, sto-
 “ mach, bowels, and urinary passages. Drops of blood
 “ issued from the inner canthus of the left eye of Mr.
 “ Josiah Coates. Dr. Woodhouse attended a lady who
 “ bled from the holes of her ears which had been made
 “ for ear-rings. Many bled from the orifices which had
 “ been made in performing venesection, several days af-
 “ ter they appeared to have been healed ; and some from
 “ wounds in veins made in unsuccessful attempts to draw
 “ blood. These last were very troublesome, and in some
 “ cases precipitated death. . . .

“ I was surprised to find so few marks of hepatic af-
 “ fection. I met with but two cases in which the pa-
 “ tient could lie only on the right side. Many com-
 “ plained of a dull pain in the region of the liver, but
 “ very few complained of that soreness to the touch,
 “ about the pit of the stomach, which is taken notice of
 “ by authors, and which was universal in the yellow fe-
 “ ver of 1762. In proportion as the cool weather ad-
 “ vanced, a preternatural determination of the blood
 “ took place to the brain and lungs. Many were affect-
 “ ed with pneumonic symptoms, and some appeared to
 “ die of sudden effusions of blood or serum in the lungs.
 “ . . . The disease seldom appeared without nausea or
 “ vomiting. In some cases they both occurred for se-
 “ veral days, or a week, before any fever took place.
 “ This was more frequently the case where the disease
 “ *was taken by exhalation from the putrid coffee, than by*
 “ *contagion.*

contagion. The stomach was so extremely irritable as to reject drinks of every kind. Sometimes green or yellow bile was rejected on the first day of the disorder; but I much oftener saw it continue for two days without discharging any thing from the stomach, but the drinks which the patient had taken. If the fever in any case came on without vomiting, or if it had been checked by remedies that were ineffectual to remove it altogether, it generally appeared or returned on the 4th or 5th day of the disorder. I dreaded this symptom on those days; for, though it was not always the forerunner of death, yet it generally rendered the recovery more difficult and tedious. In some cases the vomiting was more or less constant from the beginning to the end of the disorder, whether it terminated in life or death. The vomiting which came on about the 4th or 5th day was accompanied with a burning pain in the region of the stomach. It produced great anxiety and tossing of the body from one part of the bed to another. In some cases this painful burning occurred before any vomiting took place. Drinks were now rejected so suddenly as often to be discharged over the hand that lifted them to the head of the patient. The contents of the stomach were sometimes thrown up with a convulsive motion which propelled them in a stream to a great distance, and in some cases all over the clothes of the by-standers. . . . On the first and second days many puked from half a pint to nearly a quart of yellow or green bile. In four (three of whom recovered) the bile, even at this time, was black. On the 4th or 5th day a matter resembling coffee-grounds was discharged. . . . Many recovered in whom this symptom appeared. Towards the close of the disease there was a discharge of a deep or pale-coloured black matter, with flaky substances frequently swimming on the top of it."

A quantity of grumous blood, dark coloured on the outside, was frequently discharged by vomit towards the end of the disease; and, along with all the discharges from the stomach, there was occasionally a large worm,
and

and frequently large quantities of mucus and tough phlegm. Our author supposes the black blood and coffee-coloured matter to be different from that which constitutes the true *black vomit*. This last he supposes to arise in some cases from matter formed in consequence of a mortification of the stomach.

The bowels were generally costive, sometimes with extreme pain, tenesmus, and mucous and bloody discharges. Sometimes the disease came on with diarrhœa, principally in those who had weak bowels. Sometimes there was a tension of the abdomen, with pain in the lower part of it. Flatulency, chiefly in the stomach, was almost universal in the disorder throughout all its stages.

The colour and consistence of the *fæces* was various according to the mode of treatment the patient had undergone. Where they were spontaneous, or brought away only by gentle purgatives, their appearance was natural; but when the patient was strongly purged, they were dark-coloured, *fœtid*, and in large quantity. The colour was sometimes green, sometimes olive. Their *fœtor* was proportioned to the time they had been detained in the bowels. In one case, where tonics had been used, and the patient had no stool for several days, a purge produced such an excessively *fœtid* discharge, that the smell produced fainting in an old woman who attended. Their acrimony was so great that the rectum was excoriated, and an extensive inflammation sometimes produced round its extremity. In some cases the stools were as white as in the jaundice. Large round worms were frequently discharged with them.

The urine in this disease was sometimes plentiful and high-coloured, sometimes clear, and sometimes turbid; sometimes discharged with a burning pain, as in a gonorrhœa; sometimes it was suppressed; and in one case the patient voided several quarts of limpid urine just before he died.

Many were relieved on the first day by sweats, sometimes spontaneous, and sometimes produced by diluting drinks, or strong purges; sometimes of a yellow colour, and offensive smell. Sometimes they were cold, though
the

the pulse was full at the same time. In general, however, the skin was dry, and there were but few instances of the disease terminating by sweat after the third day. In some there was a great discharge of mucus from the throat, occasioning an almost constant hawking and spitting; and those always recovered.

In this fever, as in that of Boullam, and in the true plague, people sometimes fell down suddenly in apoplexy, syncope or universal convulsions. Some had numbness and immobility of their limbs. Some had a coma (a continual sleepiness) or an obstinate wakefulness; the latter chiefly attended a state of convalescence. In some the distemper began with a violent cramp in the legs or arms. The last stage was attended with a strong hiccup, which was a very dangerous symptom, as indeed it is in all fevers. In some cases there was a deficiency of sensibility, in others too much, so that the mere motion of the limbs was attended with pain.

In this, as in the Boullam fever, the patient often manifested a considerable degree of strength, even without any delirium. One of Dr. Rush's patients stood up before a looking-glass, and shaved himself, the day on which he died. A delirium, however, was common, alternating in some cases with the *exacerbations and remissions* of the fever, but in some continuing without intermission to a few hours before death. Some had maniacal symptoms, without any appearance of fever; but in many the understanding was not impaired throughout the whole course of the disease.

In this disease the pains in almost every part of the body were very distressing. In those cases, however, "where the system sunk under the violent impression of the contagion, there was little or no pain." In other cases the patients were distressed with pains in their head, particularly affecting the eyeballs. Sometimes it extended from the back down the neck. A pain was felt in the ears, as if they were drawn together by strings. The sides, stomach, liver and bowels were all affected. A burning pain in the stomach was sometimes so excessive that the patient shrieked out violently. The back
was

was often the seat of violent pain, which sometimes extended from the back to the thighs; and the arms and legs were sometimes affected in such a manner that one patient said his limbs felt as if scraped with a sharp instrument.

The thirst was generally moderate, but sometimes otherwise; and, when excessive thirst came on in the last stage of the disorder, it was a dangerous symptom. Water was preferred to all other drinks. The appetite for food returned much sooner in this than in other fevers, and was excessively keen. Coffee was relished in the remissions, in every stage of the disorder. Wine was disliked, but malt-liquors were agreeable. In some cases the recovery was attended with a great propensity to venery, as in the true plague, but in an inferior degree.

In some cases the disease was attended with buboes and glandular swellings. "I met with three cases (says our author) of swellings in the inguinal, two in the parotid, and one in the cervical glands: all these patients recovered without any suppuration of their swellings. They were extremely painful in one case, in which no redness or inflammation appeared. In the others there was considerable inflammation, and but little pain.

"Several cases of carbuncles, such as occur in the plague, came under my notice. They were large, hard swellings on the limbs, with a black apex, which, upon being opened, discharged a thin, dark-coloured, bloody matter. From one of these malignant sores an hæmorrhage took place, which precipitated the death of an amiable lady. A large and painful anthrax on the back succeeded a favourable issue of the fever in another patient. I met with a woman who showed me the marks of a number of small boils on her face and neck, which accompanied her fever. . . . Notwithstanding the disposition to cutaneous eruptions in this disorder, it was remarkable that blisters were much less disposed to mortify than in the common nervous fever. Such was the insensibility of the skin in some people, that blisters made no impression upon it. . . .

"In

"In every case of this disorder which came under my notice, there were evident remissions or intermissions of the fever, or such symptoms as were substituted for fever."

The yellow colour rarely appeared before the third day, and generally about the fifth or seventh day. The eyes were not always affected with this colour. Sometimes it appeared first on the neck and breast; and in one case it appeared behind the ears and on the crown of the head, which had been bald for some years. It varied in the deepness of the tint, and sometimes disappeared altogether; but, though some cases of great malignity and danger appeared without any yellowness, it was always a dangerous symptom when it appeared early. The cause of this yellowness is by our author supposed to be an absorption and mixture of the bile with the blood.

After death the body appeared of a deep yellow colour, sometimes a few minutes after death; sometimes it was purple or black; and in one case yellow above, and black below, the middle. In some it was pale, as in common diseases, and many died with a placid countenance as in natural sleep. In some the body grew cold soon after death, in others not till six hours afterwards, and in like manner stiffness occurred sometimes in one hour, in others not till six. Where evacuations had been procured, symptoms of putrescence were longer in making their appearance than in those who had used no medicines for that purpose. Many discharged large quantities of black matter from the bowels, others, of blood from the nose, mouth and bowels.

"The morbid appearances of the internal parts of the body (says the Doctor) as they appear by dissection after death, from the yellow fever, are different in different countries and in different years." Dr. Mitchill, in his history of the yellow fever in Virginia, in 1737 and 1741, informs us, that, in a female slave of forty, the gall-bladder was outwardly of a deep yellow, but within, full of a black, ropy, coagulated *atrabilis* (black bile) obstructing

obstructing the biliary ducts. It was so thick, that it retained its figure when the gall-bladder was opened. It more resembled bruised and mortified blood than bile, though it would stain a knife or probe of a yellow colour. Two thirds of the liver on its concave surface were of a deep black colour, and round the gall-bladder it seemed to be mortified and corrupted. A viscid bile, like that just described, was found in the duodenum near the gall-bladder. The villous coat being taken off, the other parts were found red and inflamed. The whole was lined with a thick fur or slime. The omentum was so much wasted, that nothing but its blood-vessels could be perceived. The stomach appeared to be distended or swelled, lined like the duodenum, containing a quantity of bile even blacker than that in the bladder. It was inflamed both on the outside and inside. The lungs were inflated and all full of black or livid spots; and on these spots were small blisters like those of an erysipelas or gangrene, containing a yellow humour. The blood-vessels in general were empty; only the vena portarum seemed full and distended as usual. On cutting the sound part of the liver, the lungs or the spleen, blood issued freely.

Dr. Mackittrick found the liver sphacelated, the gall-bladder full of black bile, and the veins tinged with a black *fluid* blood. In all cases the stomach, duodenum and ilium were remarkably inflamed. The pericardium contained a viscid yellow serum, and in larger quantity than usual. The urinary bladder a little inflamed; the lungs sound.

Dr. Hume, of Jamaica, found the liver enlarged and turgid with bile, and of a pale yellow colour; the stomach and duodenum sometimes inflamed; and, in one case, the former had black spots of the size of a crown-piece. He had seen some bodies in which there was no appearance of inflammation of the stomach, though the patients had been afflicted with excessive vomiting.

Dr. Lind's account is given p. 394.

Drs. Physic and Carthall, of Philadelphia, found the brain in a natural state; the viscera of the thorax perfectly

fectly sound ; the blood in the heart and veins fluid, similar in its consistence to the blood of persons who have been hanged, or destroyed by electricity. “ The stomach and beginning of the duodenum are the parts that are most diseased. In two persons, who died of the disease on the 5th day, the villous membrane of the stomach, especially about its smaller end, was found highly inflamed ; and this inflammation extended through the pylorus into the duodenum some way. The inflammation here was extremely similar to that induced in the stomach by acrid poisons, as by arsenic, which we have once had an opportunity of seeing in a person destroyed by it. The bile was of its natural colour, but very viscid.”

In others the stomach was spotted with extravasated blood ; and it contained, as well as the intestines, a black liquor like that which had been vomited and purged before death. The gentlemen were of opinion that this must have been a secretion from the liver, as a fluid of the same kind was found in the gall-bladder, of such an acrid nature that it inflamed the operator's hands, and the inflammation lasted some days. The liver was of its natural appearance, or nearly so. These dissections were made early in the season ; and at that time Dr. Rush is of opinion that the disease was not attended with any congestion in the brain, though it was so afterwards ; and accordingly we are informed that Dr. Annan attended a dissection at Bush-hill, in which the vessels of the brain were remarkably turgid. Dr. Rush, however, is likewise of opinion, that the morbid appearances in the brain may cease after death, as well as the suffusion of blood in the face disappears after the retreat of the blood from the extremities of the vessels in the last moments of life. “ It is no new thing for morbid affections of the brain to leave either slender or no marks of disease after death. Dr. Quin has given a dissection of a child that died with all the symptoms of hydrocephalus internus, and yet nothing was distinguished in the brain but a slight turgescence of the blood-vessels. Dr. Girdlestone says, that no injury appeared in the

“brains of those persons who died of the symptomatic
 “apoplexy which occurred in a spasmodic disease which
 “he describes in the East Indies; and Mr. Clark in-
 “forms us that the brain was in a natural state in every
 “case of death from puerperal fever, notwithstanding it
 “seemed to be affected in many cases soon after the at-
 “tack of the disorder.”

With regard to the state of the blood in this distem-
 per, Dr. Rush says, that when drawn from a vein, it was.
 “1. In the greatest number of cases, dense, and of a
 “scarlet colour, without any separation into crassamen-
 “tum and serum. 2. In many cases it did separate in-
 “to crassamentum and yellow serum. 3. In a few ca-
 “ses the serum was of a natural colour. 4. There were
 “many cases in which the blood was as fizy as in pneu-
 “mony and rheumatism. 5. In some instances the
 “blood was covered with a blue pellicle of fizy lymph,
 “while the part which lay in the bottom of the bowl
 “was dissolved. In two cases the lymph was mixed
 “with green streaks. 6. It was in a few instances of a
 “dark colour, and as fluid as *molasses*. Both this and
 “the 5th kind of blood occurred chiefly where bleeding
 “had been omitted altogether, or used too sparingly, in
 “the beginning of the disorder. 7. In some patients
 “the blood in the course of the disease exhibited nearly
 “all the appearances which have been mentioned.
 “They were varied by the time in which the blood was
 “drawn, and by the nature and force of the remedies
 “which had been used in the disorder.”

From this account of the different appearances of the
 blood, it appears to have varied at the very first attack
 from an healthy state, and to have gradually deviated
 from that state more and more, as the disease advanced.
 Dr. Rush says,* from Dr. Mitchill's History of the Yel-
 low Fever in Virginia, in 1741, that “blood drawn
 “from a vein was always dissolved. The same state of
 “the blood was observed in many persons who had been
 “exposed to the contagion, who discovered no other
 “symptom of the disease.” In p. 70 Dr. Rush
 gives

* Account of the Bilious Remitting Fever, &c. p. 106.

gives his own opinion in the following words : " I shall say, hereafter, that the blood was seldom dissolved in this fever ;" and p. 73, speaking particularly of the blood, he enters into an argumentation against the putrescency of that fluid. " It" (the blood) says he, " has been supposed to undergo a change from a healthy " to a putrid state ; and many of the symptoms which " have been described, particularly the hæmorrhages and " eruptions on the skin, have been ascribed to this supposed putrefaction of the blood. It would be easy to " multiply arguments to prove that no such thing as " putrefaction can take place in the blood ; and that " the symptoms which have been supposed to prove its " existence are all effects of a sudden, violent and rapid " inflammatory action, or pressure upon the blood-vessels ; and hence the external and internal hæmorrhages. The petechiæ on the surface of the skin depend " on the same cause. They are nothing but effusions " of serum or red blood, from a rupture or preternatural dilatation of the capillary vessels. The smell emitted from persons affected with this disease was far from " being of a putrid nature ; and, if this had been the " case, it would not have proved the existence of putrefaction in the blood ; for a putrid smell is often discharged from the lungs, and from the pores in sweat, " which is wholly unconnected with a putrid, or perhaps any other morbid, state of the blood. There are " plants which discharge an odour which conveys to the " nose a sensation like that of putrefaction ; and yet " these plants exist at the same time in a state of most " healthy vegetation : nor does the early putrid smell of " a body which perishes with this fever prove a putrid " change to have taken place in the blood before death. " All animals which die suddenly, and without loss of " blood, are disposed to a speedy putrefaction. This " has long been remarked in animals that have been killed after a chace, or by lightning. The poisonous air called *janiel*, which is described by Chardin, " produces, when it destroys life, instant putrefaction. " The bodies of men who die of violent passions, or after

" ter

“ ter strong convulsions, or even after great muscular
 “ exertion, putrefy in a few hours after death. The
 “ healthy state of the body depends upon a certain state
 “ of arrangement in the fluids. A derangement of these
 “ fluids is the natural consequence of the violent and ra-
 “ pid motions, or of the undue pressure upon the solids,
 “ which have been mentioned. It occurs in every case
 “ of death from indirect debility, whether it be induced
 “ by the excessive stimulus of contagion, by the volatile
 “ vitriolic acid which is supposed to constitute the destruc-
 “ tive *samiel* wind,* or by violent commotions excited in
 “ the body by external or internal causes. The practice a-
 “ mong fishermen in some countries of breaking the heads
 “ of their fish as soon as they are taken out of the water,
 “ in order to retard their putrefaction, proves the truth
 “ of the explanation I have given of its cause soon after
 “ death. The sudden extinction of life in the fish pre-
 “ vents those convulsive or violent motions which induce
 “ sudden *disorganization* in their bodies. It was re-
 “ markable that putrefaction took place most speedily
 “ after death from the yellow fever, where the commo-
 “ tions of the system were not relieved by evacuations.
 “ In those cases where purges and bleeding had been
 “ used it was much slower. There is a fact mentioned
 “ by Dr. Ferriar, from Dr. Hamilton, late professor of
 “ anatomy at Glasgow, which may seem at first to mili-
 “ tate against the facts I have mentioned. He says that
 “ he had observed that bodies which were brought into the
 “ dissecting room that had petechiæ on them were
 “ longer in putrefying than any others. The fevers of
 “ which the poor (the common subjects of dissection)
 “ die, are generally of the low nervous kind. Great di-
 “ rect debility is the characteristic of those fevers. The
 “ petechiæ which occur in them appear in the last stage
 “ of this direct debility. They are the effect, not of
 “ too much impetus in the blood, as in the yellow fever,
 “ but of a defect or total absence of it in the last hours of
 “ life. The slow progress of the body to putrefaction
 “ after

* See p. 126, n. where an account is given of the *samiel*, and another hy-
 pothesis concerning its nature.

“after death, in the instances mentioned by Dr. Hamilton, seems to depend upon the same cause as that to which I have ascribed it in those cases of death from the yellow fever in which evacuations had been used, viz. direct debility. In the former cases this slowness of putrefaction is induced by nature, in the latter by art. The effects of debility from both causes are, notwithstanding, the same.”

From this long detail, in which the author's meaning seems rather involved in obscurity, we may gather that in the fever of 1793 the blood had no determinate appearance, but that, according to the action of the vascular system, it was fizy or otherwise. This position, which in my opinion is the meaning of the passage just now quoted, is not supported by any facts. It is mentioned indeed that the blood in some was fizy, in others quite fluid, but as the cases in which it was so are not particularly related, we do not know whether the action of the vessels was stronger in those where the blood was fluid than where it was not. Certain it is, that the blood may be made fluid by certain substances mixed with it, without any action of the vessels at all. The poison of the ticunas, as well as all other animal poisons, renders the blood fluid, yet this will kill instantaneously when injected into a vein, before the vessels have time to act in such a manner as could be supposed to change the texture of any of the fluids.* Or if this still will not satisfy, we are assured that the poison of serpents, as well as many other substances, which are not poisons, when mixed with the blood taken out of the body, will prevent it from coagulating. Granting, therefore, what hath not been proved, that the greater the action of the vessels, the more fluid the blood will be, yet we cannot know whether this fluidity be occasioned by the action of the vessels, or the action of the vessels by the tendency to fluidity in the blood. But it matters not which of the two is cause or effect: the question is, Whether in the yellow fever does the ultimate effort of the disease tend to produce any alteration in the texture of the blood to fluidity, or otherwise?

* See p. 221—223.

wife? This can be known only from considering the symptoms which take place in the last stage of the disorder, and from dissections. Now, from the concurrent testimonies of all the writers quoted in this treatise, it appears that towards the end of the disease there is such a tendency to dissolution, that the whole body seems ready to fall down into a putrid mass; or at least into what is commonly called so, whether with strict propriety of language or not, signifies little. In short, the difference between the plague and yellow fever seems to be entirely of the same kind with that taken notice of in this treatise, p. p. 269, 270, where the bile of a person dying of a malignant fever was injected into the veins of a dog. Here the blood was very fluid. In capt. Mawhoods case (p. 385) the blood flowed from his nose, eyes and gums, besides what he discharged by vomit. Dr. Lining (p. 389) attests a similar tendency to dissolution in the blood in a most remarkable manner. See also Dr. Lind's opinion to the same purpose, p. 393, Dr. Hillary's, p. 395, Dr. Jackson's account, p. 399, Dr. Chisholm's, p. 411; and lastly, Dr. Rush's own testimony concerning the hæmorrhages from all parts, lately quoted.

As we have formerly seen, that in the plague there was no such tendency to dissolution, but rather to coagulation, in the blood, it was thence concluded that the immediate cause of the symptoms of plague is a tendency in the blood to throw out the latent heat it contains, by which means the parts on which these discharges fall, are burnt up to a kind of cinder. In the yellow fever the reverse takes place. The blood has a tendency to absorb heat, and if it does so it must of course become thinner, for this is the nature of all fluids, and indeed it is abundantly manifest that fluidity in all cases is an effect of the absorption of heat.* In consequence of this absorption, the body towards the latter end feels cold, the heat seems to retire from the extremities towards the vital parts, and the vessels contracting and losing their power by reason of the abstraction of sensible heat, the pulse ceases entirely some time before death. Dr. Hux-

ham

ham takes notice of this excessive coldness in the limbs taking place in a lady who died of a malignant fever, and likewise that an intolerable stench issued from her body for some time before her death, though kept clean with all possible care. As the plague therefore is the highest of all inflammatory diseases, so the yellow fever seems to be the highest of the malignant class.

It may be objected, however, that as hæmorrhages, petechiæ, black vomiting, and convulsions, sometimes take place in the plague, we cannot from the existence of similar symptoms in the yellow fever, conclude that they are different diseases. But, with regard to the first, it must be observed, that an hæmorrhage may ensue from a rupture of vessels as well as from an oozing of blood in consequence of an acrimonious thinness of blood. It is indeed to be questioned, except in cases where blood is discharged by the pores of the skin, whether any hæmorrhage takes place but by a rupture of vessels. In an healthy subject, hæmorrhages very frequently take place from the nose where the blood is of a very proper consistence; and Dr. Russel says that he had occasion to see hæmorrhages from the nose and uterus only; that in the advanced stages of the disease though the blood was paler and of a *thinner* consistence, the hæmorrhage was seldom profuse. It was, however, of very bad omen; most of the cases in which it appeared having terminated fatally.

That towards the end of this disease the blood should begin to absorb the heat which it had before thrown out, is not wonderful. A tendency to dissolution very probably does in all cases take place in a greater or lesser degree; but we have not any reason to suppose that in the true plague hæmorrhages ever are as frequent, violent, or attended with such an apparent tendency to putrefaction, as in the yellow fever, and consequently we must suppose that there is some *specific* difference between the state of the blood in the one disease and in the other.

Convulsions, though very frequent in the yellow fever, yet, according to Dr. Russel, were very rare attendants

ants on the access of the pestilential fever. Even hiccup was seldom observed, and sneezing not once. However, he says that convulsive motions of the limbs were frequently observed in the course of the disease; but this is far from what Dr. Chisholm says of the Boullam fever, where the patient expired in a violent convulsive fit; or what Dr. Rush says of the fever of 1793, in which the patient sometimes fell down in universal convulsions. In short, the absence, or much less frequency, of nervous symptoms in the plague, seems to constitute another *specific* difference between the two.

With regard to black vomiting, it is neither peculiar to the plague nor yellow fever. Dr. Miller* has shown that it may be occasioned by almost any kind of acrid poison taken into the stomach. In proof of this he quotes from Sauvages the case of a man who died in consequence of taking a drachm of white arsenic instead of cream of tartar, in whose stomach was found, on dissection, a black liquor which deposited a sediment like powdered charcoal. The villous coat of the stomach was likewise abraded. For other cases of the same kind he refers to Wepfer de cicuta aquatica, Morgagni, &c. Another case of poison by arsenic occurred in New-York hospital, in which the patient had a black vomiting. In another case in which corrosive mercury was swallowed by mistake, the patient, after being to appearance in a fair way of recovery, began to vomit a dark-coloured matter, and died in a day or two. The agaricus clypeatus, a kind of poisonous mushroom, brought on bilious stools, locked jaw, vomiting, delirium, oppression of the breast, sighing, anxiety, great prostration of strength, yellowness on some parts of the skin, and death on the sixth day. On dissection the stomach was found to be inflamed, the duodenum distended with flatus, and the gall-bladder full of green and black bile.

But the principal distinctions between the plague and yellow fever seem to be the eruptive nature of the former, and the propensity in the latter to attack strangers newly arrived from colder climates; also in being more easily

* Med. Repository, vol. ii. p. 412.

ly checked by cold than the plague. It has already been remarked from Dr. Ruffel, that of *two thousand seven hundred* patients, whose cases he noted, every one had buboes. These, however, were not all the cases he saw; for he mentions some that had no eruptions; but from this it is impossible to avoid drawing the conclusion, that eruptions are the true characteristics of the plague. Of these two thousand seven hundred, eighteen hundred and forty-one had buboes in one or both groins; five hundred and sixty-nine had them in the arm-pit; two hundred and thirty-one had parotids; four hundred and ninety, carbuncles; and seventy-four, spurious buboes. Now, in all the number of cases of fever which Dr. Rush attended in 1793, he had only two with buboes, and one parotid; and as to the carbuncles they do not answer the description of those in the former part of this work.* It is impossible therefore that any more clear line of distinction can be drawn between the plague and yellow fever. The following table, however, exhibiting at one view the symptoms of the plague, the yellow fever, fever of Boullam, and fever of 1793, will perhaps set this matter in a still clearer light.

From a mere inspection of the detail of symptoms in this table, the difference between the several distempers is obvious. It is evident that none of them can with any kind of propriety be called higher and lower degrees of the rest. The plague is *essentially* different from the other three, which seem indeed to be nearly allied; the Boullam fever being only attended with more violent and malignant symptoms. We ought now to enter into a particular inquiry concerning the origin and nature of these fevers; but, as a knowledge of this is in some measure dependent on the question, whether or not they are contagious, we shall in the first place present the reader with the following extract from a French treatise, in which the question seems to be handled in an agreeable and judicious manner, and then make another attempt, by an investigation of matter of fact,

* See p. 257.

fact, to determine whether the disease has ever been excited by imported contagion or not :

“ A very important question is—whether this disease
“ is contagious. The greater part of the American phy-
“ sicians are of opinion that it is, and are persuaded that
“ it is brought from the West Indies, by the ships which
“ arrive here in the beginning of every summer. It is
“ even from that opinion, and on their vigorous represen-
“ tations, that quarantines have been established, which
“ every vessel from the West Indies is obliged to perform
“ during 10 and sometimes 20 days at Fort Mifflin, se-
“ veral miles distance from Philadelphia. This forma-
“ lity, so troublesome to navigation, was observed this
“ year (1798) with more severity than ever it was ; but
“ without answering any good purpose for the vessels ;
“ for very few ships’ companies appeared taken with the
“ *yellow* or *putrid fever*. Nevertheless the epidemic,
“ whatever name it assumes, raged this year in Phila-
“ delphia with more fury than even in 1793. Besides,
“ if the quarantine was a sure preservative, if almost all
“ the ships’ crews coming from the West Indies brought
“ the *yellow fever* with them, why should not CHARLES-
“ TON, NORFOLK, ALEXANDRIA, BALTIMORE, BOS-
“ TON and SALEM, where no quarantines are performed,
“ be affected with the contagion, as well as New York
“ and Philadelphia ? The American physicians are so
“ convinced that the *yellow fever* is contagious, that they
“ scrupulously prohibit persons in health from all com-
“ munications with those diseased ; they order frequent
“ *waterings* in the streets and about the houses where
“ the fever has manifested itself, and aromatic fumiga-
“ tions. They even order the clothes of those who have
“ fallen by it to be burned, as is practised with respect
“ to those who die with the plague. It must be confes-
“ sed that their precautions, in this respect, have in
“ some sort been justified, on seeing all the individuals
“ of one family successively taken with it, and often at
“ the same time, their neighbours, and so on, to a num-
“ ber of people who might be authorised to attribute
“ their misfortunes only to their vicinage with the first
“ victims. “ Nevertheless,

OF THE

Characters and most remarkable Symptoms

OF THE

Plague, Yellow Fever, Fever of Boullam, and of Philadelphia in 1793.

*(In this table the mark Do. refers to the column immediately preceding.)**General Characters.*

PLAGUE.	YELLOW FEVER.	FEVER OF BOULLAM.	FEVER OF PHILADELPHIA IN 1793.
Known and described by ancient historians.	Not known to exist before the last century.	Supposed by Dr. Chisholm to be a kind of new disease, originating in foul vessels on the coast of Africa in 1793.	Various opinions concerning it.
Attacks indiscriminately people of all nations.	Attacks principally those who change their climates, especially from cold to hot.	Do.	Attacks more generally than the common yellow fever.
Not brought on by intemperance. At least Dr. P. Russel never saw an instance.	Brought on not only by intemperance, but by slight errors in regimen.	Do.	Do.
Sometimes seems to spare the weakly and delicate, and to attack the robust.	Attacks the robust much more violently than those of a contrary description.	Attacks the intemperate and robust.	As in the yellow fever.
People sometimes struck dead as by a stroke of lightning. Sometimes fall down suddenly, but revive, and by proper management regain their health in a short time.	Not observed.	Those attacked by the disease fall down giddy and almost insensible, with a profuse cold sweat.	Patient sometimes falls down in apoplexy, syncope or universal convulsions.
Death sometimes takes place without any fever or complaint; preceded only by momentary sickness, by eruptions of purple spots, or the breaking out of hard eschars in different parts of the body.	Death sometimes within twenty-four hours, but not without some previous complaints.	Do.	Do.
Irregular remissions and exacerbations.	No remission, but a cessation of one set of symptoms to make way for another.	Do.	Remissions and exacerbations.
Venereal appetite monstrously increased on recovery.	Not observed.	Do.	Venereal appetite increased, but less than in the plague.

Symptoms of the Disease in various parts of the Body, or over the whole System.

PLAGUE.	YELLOW FEVER.	FEVER OF BOULLAM.	FEVER OF PHILADELPHIA IN 1793.
Infection sometimes begins with apparent intoxication.	Not commonly observed.	Do.	Do.
Sometimes is felt like an electric stroke.	Not observed.	Infection felt at the commencement of the disease, occasioning a nausea and rigor.	Do.
Fainting very frequent.	Do.	Do.	Do.
Convulsions rare at the beginning. Convulsive motions of the limbs not unfrequent throughout the disease.	Not commonly observed.	Convulsions sometimes very violent: the patient often expiring in a fit.	Tremors of the limbs uncommon.
Hiccup uncommon.	Hiccup extremely common.	Do.	Do.
Sudden loss of strength.	Do.	Excessive strength during the delirium.	A surprising degree of strength sometimes only a few hours before death.
Delirium at times.	Do.	Do. Sometimes constant.	Do.
Loss of speech, faltering and trembling of the tongue.	Not observed.	Do.	Do.
Coma very general.	Do.	Do.	Do.
Muddiness of the eyes, scarce to be described.	Grimness of countenance. Eyes red and heavy.	Eyes inflamed, watery, rolling and protruded.	Eyes watery, inflamed, or like balls of fire. Countenance wild and ferocious.
A green all over. The patient becoming	A deep yellow colour all over the body is common that the disease has one of its names from it.	The yellow colour is very frequent.	Yellow colour very frequent.
Eruptions of the nature of eschars, sometimes small, and called tokens, pepper-corns, &c. sometimes larger, and called carbuncles, on many different parts of the body.	Never observed.	A kind of small eschars in the nose. Small black spots on the upper lip, but neither resembling the tokens or carbuncles in the	The carbuncles do not answer to any description of those in the plague.

human, and called tokens, pepper-corns, &c. sometimes larger, and called carbuncles, on many different parts of the body.

Buboes in the inguinal, axillary and parotid glands exceedingly common.

Pulse extremely variable; disappearing entirely on pressure; often intermitting.

Excessive uneasiness at the heart. One person died with violent palpitation.

Violent pain at the pit of the stomach, which could not bear the touch.

Hæmorrhages not very common, and only from the nose and uterus.

Vomiting of yellow, green and black matter.

Stools less foetid than in a common tertian. Dark coloured blood sometimes discharged.

Sweats of various colours, and foetid.

Sweat the natural crisis of the distemper.

Very rarely observed.

Pulse sometimes indistinguishable from that of a healthy person, even a short time before death. Otherwise of all possible varieties. Sometimes entirely gone a considerable time before death.

Not observed. In the last stage the heart palpitates strongly.

Universal in the yellow fever of 1762.

Hæmorrhages excessively common from every part of the body.

Vomiting of matters of the same kind; also of matter resembling coffee grounds, with flaky substances floating in it.

Stools excessively foetid, and in great quantity.

Not observed.

No natural crisis.

black spots on the upper lip, but neither resembling the tokens or carbuncles in the plague. Carbuncles mentioned, but not described.

Sometimes observed, but only in fatal cases.

Pulse disappearing on pressure. Did not intermit even at the approach of death.

Do.

Very frequently observed.

Do.

Do.

Do. Immense quantities of excessively foetid blood discharged.

Not observed.

Do.

tion of those in the plague.

A very few instances.

Pulse disappeared as in the plague and Boullam fever; otherwise as in the yellow fever.

Do.

Disease sometimes began with a pain in the stomach. A burning pain frequently accompanied the vomiting.

Do.

Do.

Stools extremely foetid when strong evacuants had been used, otherwise the foetor was less.

Yellow and foetid sweats.

Seldom terminated by sweat after the third day.

Appearances on Dissection.

PLAGUE.

Bile of a black and greenish colour; turning quite black by the addition of spirit of nitre; a lasting grass green by adding spirit of vitriol; and of a yellow by the addition of alkalies.

Heart of an extraordinary bigness; in seven cases stuffed with thick, black blood; in one, filled with a large polypus; in another the contents not mentioned.

Lungs in five cases either purple, livid, or covered with spots of these colours.

Liver greatly enlarged, with mortified spots in five cases. Stuffed also with thick blood.

Mortifications in the brain, intestines, &c.

Abscesses in two cases; one in the muscular integuments of the thorax, the other in the aorta.

YELLOW FEVER.

Bile of a black colour, and very viscid.

Stomach affected by gangrenous spots called carbuncles by Dr. Lining.

Blood very fluid, and the vessels of the viscera much distended.

Duodenum and other parts of the intestines mortified.

Worms from putrefaction found in the stomach in six hours.

Omentum and its appendages of a dark grey colour, and uncommonly dry.

Liver and spleen enlarged.

FEVER OF BOULLAM.

Intestines mortified.

Effusions of blood and serum in the brain.

Liver sometimes shrunk up into half its natural size.

FEVER OF PHILADELPHIA IN 1793.

Bile very viscid.

Congestion of blood in the brain.

Blood in a fluid state. Stomach and intestines inflamed.

Liver sometimes of its natural appearance.

Fever of 1798.

Doctors RAND and WARREN'S Dissections.

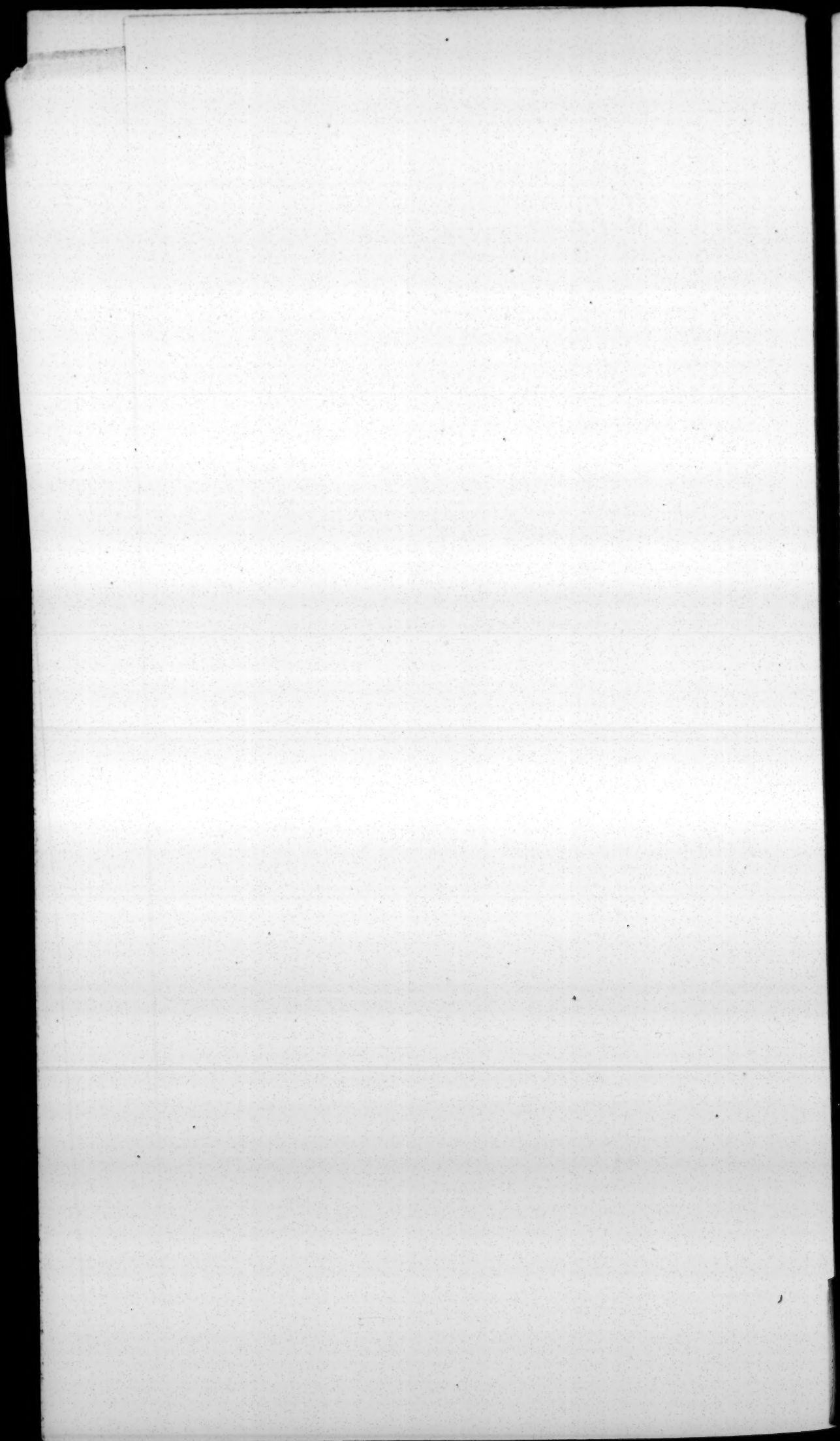
CASE I. Patient died on the 6th day. Lungs filled with dark blood. Air vessels not distended. Large extravasation of firmly coagulated blood in the thorax. Fluid blood in the pericardium. Coronary veins extremely distended. Liver inflamed on both sides, and indurated as if boiled. Gall bladder contracted, and containing only about a quarter of an ounce of a substance resembling pitch. The secretion of bile had apparently ceased for some time. Stomach and intestines inflamed, and their veins distended. Omentum thick, red and dark coloured from the swelling of its vessels. Spleen enlarged, but without inflammation.

CASE II. Death on the 14th day. Patient had been delirious since the 6th. Blood vessels of the brain greatly dis-

tended. An effusion of serum between the dura and pia mater. A band of coagulated lymph producing an adhesion between the two coverings of the brain, under the sagittal suture. Lungs adhered firmly to the pleura, and had several indurations of the size of a pigeon's egg. Left lobe extremely diseased, and in a state of suppuration. Liver much enlarged and inflamed, the inside of the great lobe near the gall bladder appearing as if contused. Stomach covered on the inside with the matter of the black vomit, though the patient had no evacuation of that kind. Duodenum and small intestines much inflamed. Gall bladder full of bile, and ducts pervious. Bladder contracted to the size of a pullet's egg, with a quantity of blood effused in it.

CASE III. Death on the fourth day. Lungs inflamed on the fore part, and exceedingly stuffed with blood in the back parts. Liver inflamed, and of a very dense consistence. Gall bladder entirely obliterated; its coats forming a confluent membranous substance by coalescence with the neighbouring parts. Stomach covered in the inside with the black vomit. Colon and part of the omentum inflamed.

In the two cases where the gall bladder had been diseased, and the liver did not perform its functions, the patients became yellow; but not in the other, where the bile was in due quantity. In the second case the patient had previously had a pulmonary complaint.



“ Nevertheless, if this distemper was as contagious as
“ certain physicians pretend, why should they not be the
“ first to be taken with it ; they who see, examine and
“ touch many patients every day ? Why should not
“ those who nurse them day and night, who continually
“ breathe those putrid miasmata ; why should not those
“ who attend the hospitals, those who daily carry 30 or
“ 40 coffins to the grave, be taken with it ? We do not
“ hear, however, that the physicians, surgeons, nurses and
“ sextons have enlarged the funeral list more than any
“ other class of citizens. Some doubtless have fallen,
“ and perhaps they owed their death to their frequent
“ communications with the sick ; but would the epi-
“ demic have spared them in any other condition, more
“ than a number of unfortunate people who are neither
“ physicians nor nurses ?

“ Another particular not less remarkable is, that the
“ *yellow fever* seems hitherto to have spared the French-
“ men who have resided in the West India colonies, the
“ greatest part of whom have nevertheless staid in New
“ York and Philadelphia during the *yellow fever*, and
“ have lived in the midst of the contagious air which
“ proves so fatal to the Americans. The result of all
“ this is, that, notwithstanding four years’ experience,
“ notwithstanding the public and private researches and
“ discussions which took place between the physicians
“ and philosophers of the American continent, there is
“ still much uncertainty on the nature of the distemper
“ which so rapidly depopulates New York and Philadel-
“ phia. Every opinion, every system, presents palpable
“ contradictions, and is liable to objections which it is
“ difficult, not to say impossible, to answer in a satisfac-
“ tory manner. If the disease be contagious, why are
“ not the physicians, the nurses, the servants of the hos-
“ pitals, taken sooner than persons who have no sort of
“ communication with the sick ?

“ If it be not contagious, how happens it that the na-
“ tives of every age and sex, many of which, the women
“ and children especially, live in a pretty sober manner,
“ and seldom drink any of those liquors so liable to in-
“ flame the blood, are taken with it, and fall, in spite of
“ all

“ all the efforts of medicine ? How happens it that the
 “ Europeans and Frenchmen who have never been in
 “ the colonies are attacked like the Americans, whilst
 “ the planters in the West Indies are spared ?

“ On the other hand, if, as the French physicians pre-
 “ tend, this is nothing else than the malignant putrid
 “ fever, often prevalent in Hispaniola, how happens it
 “ that those medicines and that mode of treatment
 “ which were so frequently successful in the colonies have
 “ no sort of success when administered to Americans,
 “ and seldom with Europeans ? Why is this fever at-
 “ tended, in its very first stage, with vomitings of blood,
 “ bile, black spots, *purples* and other alarming symptoms,
 “ which they frequently have at Hispaniola ? How
 “ comes it that the West India planters, who, while
 “ they resided in the colonies, had frequent attacks of
 “ putrid and often inflammatory fevers, enjoy the most
 “ blooming health ever since they have been on the
 “ American continent ? And why are they not taken
 “ with those putrid and inflammatory fevers, at a time
 “ when those who have given them an asylum are the
 “ daily victims of it ? Finally, if we must attribute the
 “ epidemic to no other cause than the immoderate heat
 “ of the summer, which is really greater here for two or
 “ three months than at Hispaniola, where a land and
 “ sea breeze tempers its violence, why does it not stop
 “ its ravages when the heat moderates ? We have ob-
 “ served in the epidemics of New York and Philadel-
 “ phia, that they were less destructive in the burning
 “ dog-days than in the months of September and Oc-
 “ tober, when the mornings, evenings and nights begin
 “ to be cool, and even cold enough to allow people to
 “ go clothed as warmly as in winter.

“ We have now a recent and striking example that it
 “ is not heat only which causes the epidemics ; since
 “ there were only, in the month of September, three or
 “ four days of great heat. The rest were very cool. It
 “ may even be said that from the 22d it was cold, espe-
 “ cially on the 28th and 29th, when a violent north
 “ wind obliged many people to have a fire. The num-
 “ ber

“ber of deaths never were, however, so numerous as they
“have been since the 20th of September. The funeral
“list, which in July and August amounted to 40 per day,
“reached on the 20th of September to 78, the 22d, 68,
“the 23d, 71, the 24th, 63, the 25th, 80, the 26th,
“77, the 27th, 96, the 28th, 106, the 29th, 76, and
“from the 29th at twelve o’clock, to the 1st of Octo-
“ber, same hour, the number was 170 ; a number as
“prodigious as it is frightful : we could not therefore
“even flatter ourselves that the severest frosts of the end
“of October would dispel the epidemic, did not expe-
“rience afford us that comforting hope.

“What then is the physical cause of this scourge,
“which all human prudence and science are unable to
“avert ? The ministers of religion will not fail to as-
“cribe it to celestial wrath, and to advise prayers, fast
“and charity to appease it. Those pious practices can-
“not assuredly do harm ; but the philosophical observer,
“who does not conceive that Philadelphia and New
“York should have excited the Heavenly wrath more
“than those of other cities of the continent, will seek for
“more natural causes, and will examine whether they
“should not be attributed to some local and peculiar
“vice of those two unfortunate cities, and perhaps to
“the temperament, the diet, the mode of life, of their
“inhabitants. Respecting this, we do not find, in the
“localities of New York and Philadelphia sufficient
“reasons, nor in the constitutions or mode of life of their
“inhabitants sufficient variations, to mark them as the
“victims of the *yellow fever*, while the inhabitants [of
“other places] are free from it.

“I am however inclined to think that New York and
“Philadelphia, more than any other cities, contain
“causes of corruption or putridity, occasioned by their
“size and the extent of their commerce, which, added
“to the high mode of life of the Americans, may be
“the source of the calamity which now affects them.

“In effect, we observe that in these two cities the
“epidemic has constantly manifested itself in those parts
“which are not only the most commercial, but also
“where

“ where the *common* sinks of the city meet ; where the
“ houses, inhabited by the poorer class of people, being
“ smaller, and more crowded together ; where the stores
“ contain most provisions liable to fermentation and pu-
“ tridity ; where the shipping crowded in the *wharfs*
“ render the water stagnant ; where immense quantities
“ of dirt and litter are brought from every quarter for
“ the purpose of filling up new wharves and other places
“ designed to be taken from the sea, to enlarge lands
“ to build upon ; finally, where the water used to drink
“ does not reach the pumps of the lower part of the
“ city until it has filtrated through the burying-grounds
“ and privy-houses of the upper parts, most of which
“ have no walls, and are never emptied.

“ Let us add to all those causes of infection the dead
“ dogs, cats, pigs, and rats, which are thrown into the
“ common sinks and docks, the rotten fish, and the pri-
“ vies, which in several houses, especially at New York,
“ are nothing but *tubs*, which are emptied weekly on
“ the sea shore, and we shall have less reason to won-
“ der at the putrid exhalations which issue on the eastern
“ part of New York, and at Philadelphia on that part
“ contiguous to the Delaware, and which are capable of
“ infecting the whole atmosphere, and to impair the
“ health of those who live in it. If the people who
“ dwell in those parts are not scrupulously sober, if they
“ frequently indulge in the use of spiritous liquors, if
“ they feed on such food as is generally known to be
“ unhealthy, is it to be wondered that, with such a
“ mode of life, their blood should be more disposed to
“ inflammation and to be dissolved and corrupted, in
“ the midst of an air already corrupted and loaded with
“ destructive miasmata ?

“ Now every man knows that those who live conti-
“ guous to the river at New York, and the Delaware at
“ Philadelphia, mostly sailors, shipwrights, truckmen,
“ labourers, tavernkeepers, &c. seldom trouble them-
“ selves about the quantity of their foods and drinks,
“ but indulge copiously in the use of strong liquors, of
“ which an astonishing consumption is made in those
“ parts.

“ parts. They are not in other respects more careful as
 “ to cleanliness in their narrow and low houses. There,
 “ in a *hole* called a *bedroom*, and on a feather-bed half
 “ rotted, in a heap of rags half devoured by insects still
 “ more disgusting, two and sometimes three individuals,
 “ covered with sweat, often drunk, sleep, and still in-
 “ crease the filth by their shameful and dirty mode of
 “ life. Shall we find it strange that those infected haunts
 “ should shed forth in the morning a mephitic air, ca-
 “ pable of suffocating the most robust and vigorous men?
 “ Shall we wonder that those who breathe this pestilen-
 “ tial gaz are suddenly seized with a fever? in itself perhaps
 “ not very dangerous, if it were treated in a suitable
 “ manner. But what is their method of treating it?
 “ They do not even know the name of *ptisan*, still less
 “ the use of *anodynes*, nor that of *salt of nitre*, nor of
 “ *camphor*, so proper to prevent putridity. Punch,
 “ made with rum; water mixed with gin and molasses;
 “ a sort of soup made with Madeira wine; fish; raw oys-
 “ ters, &c. these are their first medicines. If their wives or
 “ friends go to consult the apothecary, he advises the
 “ *castor-oil*, or the famous calomel pills or powders, whose
 “ virtues the quacks extol for every disease. Finally,
 “ if the fever increases, the doctor is called, who admi-
 “ nisters a light puke of 12 or 15 grains of tartar eme-
 “ tic, a plenty of laudanum to procure sleep, and who,
 “ seeing the case desperate, withdraws, saying that he
 “ was called too late! * “ Although

* In Dr. Rush's account of the fever of 1793, we find the following remarks
 on the French mode of practice, to which it seems remarkable that our author
 has given no answer: “ I proceed with reluctance to inquire into the com-
 “ parative success of the French practice. It would not be difficult to decide
 “ upon it from many facts that came under my notice in the city; but I shall
 “ rest its merit wholly upon the returns of the number of deaths at Bush-hill.
 “ This hospital, after the 22d of September, was put under the care of a
 “ French physician, who was assisted by one of the physicians of the city. The
 “ hospital was in a pleasant and airy situation; it was provided with all the
 “ necessaries and comforts for sick people that humanity could invent, or libe-
 “ rality supply. The attendants were devoted to their duty, and cleanliness
 “ and order pervaded every room in the house. The reputation of this hos-
 “ pital, and of the French physician, drew patients to it in the early stage of
 “ the disorder. Of this I have been assured in a letter from Dr. Annan, who
 “ was appointed to examine and give orders of admission into the hospital to
 “ such of the poor of the district of Southwark, as could not be taken care of in
 “ their own houses. Mr. Olden has likewise informed me, that most of the
 “ patients who were sent to the hospital by the city committee (of which he
 “ was

“ Although the inhabitants of the other parts of the
 “ city who are in better circumstances follow a mode of
 “ life more regular, feed on more wholesome aliment,
 “ and are much more cleanly in their houses (except how-
 “ ever *feather-beds* and *lower bedrooms*) it is nevertheless a
 “ fact that they are much inclined, the men especially, to
 “ eat salt meat, meat half cooked, green fruit, and still
 “ more to drink spiritous wines. Several of them allow
 “ themselves an immoderate use of the latter between din-
 “ ner and tea-time, the strength of which, added to that of
 “ the high-spiced food, and liquors, must necessarily in-
 “ crease in their blood that fermentation already exci-
 “ ted by the heat of the season. Now, shall we not
 “ concede that bodies thus predisposed ought to be
 “ more susceptible than others of the impression of the
 “ corrupted *miasmata* which are constantly exhaled from
 “ every thing that surrounds them; from the common
 “ sewers, the wharves or the docks; from the dirt and
 “ litter of the alleys and lanes; from the sulphureous
 “ bilge-water of ships; from the cellars and from the
 “ stores; in short, from those houses which contain sick,
 “ dying and dead persons?

Here the author, after stating objections on both
 sides, seems at last to determine that the disease is pro-
 duced by putrid effluvia. The dispute on this subject,
 however, hath continued so long, that we can by no
 means expect to settle it in this treatise. At first view
 one would think that nothing could be more easy than
 to determine whether the disease arose soon after the ar-
 rival of foreign vessels, or in places which had no con-
 nexion with maritime affairs. But when we come to
 particulars there is such a strange disagreement and con-
 tradiction

“ was a member) were in the first stage of the fever. With all these advan-
 “ tages, the deaths, between the 22d of September and the 6th of November,
 “ amounted to 448 out of 807 patients who were admitted into the hospital
 “ within that time. Three fourths of all the blacks (nearly 20) who were pa-
 “ tients in this hospital, died. A list of the medicines prescribed there may be
 “ seen in the minutes of the proceedings of the city committee. Calomel and
 “ jalap are not among them. Moderate bleeding and purging with glauher
 “ salts, I have been informed, were used in some cases by the physicians of
 “ this hospital. The proportion of deaths to the recoveries, as it appears in
 “ the minutes of the committee from whence the report is taken, is truly ma-
 “ lancholy!”

tradiction concerning facts, that we are in every instance driven back into the wide field of theory and argumentation. One instance of this we have already had in the case of the Boullam fever said to be imported by the *Hankey*. Let us now try another. Dr. Currie of Philadelphia, in a letter to Mr. Wynkoop of date October 10th, 1797, says that the fever at New-York, of 1795, was proved "by unquestionable facts," to have been introduced from Port au Prince by the brig *Zephyr*; and for a proof of this he refers to a letter of the health committee of New York to the governor, dated September 8th of that year. From this letter it appears that Dr. Treat visited this vessel on the 28th of July, where he found three men ill of what he called a bilious *remitting fever*, and the body of one who died that morning. Two days after, the Doctor was taken ill, and died in eight days, with unequivocal symptoms of yellow fever. On the 25th, four persons from on board the ship *William*, from Liverpool, which arrived several weeks before (the crew of which till this time had been healthy) were taken ill of fever, and died with similar symptoms in seven days. Nothing can be more direct than this evidence, yet it did not give satisfaction.

The fact was impugned by the late Dr. E. Smith, in a letter to Dr. Buel,* who produces such evidence as, in his opinion, "establishes it beyond a contradiction, "that neither Dr. Treat nor any other person contracted a fever, such as prevailed in New York in "1795, from any sick or dead man, or any thing else "connected with the vessel in question."

The evidence brought forward is the declaration and deposition of capt. Bird. In a letter to Dr. Dingley, the captain "thinks it his duty to contradict the report" that Dr. Treat "caught the disease of which he died on board the *Zephyr*." He contradicts it by a deposition, that "the mate and one mariner had the *fever and ague* "seventeen days on shore, and came on board with the "same disease; and the captain himself had a dysen-
" tery

* Webster's Collection, p. 98.

“ tery on his arrival in New York ; and John Wheeler, “ aged 16 years, died on the day of the arrival of the brig “ in New York, by *worms crawling up into his throat, and* “ *choking him.* He was sewed up in a piece of canvass, “ and ready to be committed to the deep, when Dr. “ Treat came on board, who desired the captain to have “ the canvass opened, that he might inspect the body ; “ and he only cut the canvass over the face, but did not “ make any other examination of the body.”

How far this proves captain Bird's assertion, that Dr. Treat *did not* catch the disease on board the Zephyr, the reader will judge. It is, however, inconsistent with the plan of this treatise to enter into an examination of contradictory evidence concerning matters of fact. Accounting as *nothing*, therefore, all that has been said, by *either party*, concerning the brig Zephyr, let us proceed to other testimonies.

In a collection of *facts and observations* by the College of Physicians, published last year, we find the following remarkable accounts tending to prove that the disease was introduced by the ship Deborah, from Port au Prince and Jeremie in St. Domingo : 1. In a letter from Dr. Stevens to Dr. Griffiths it is stated, that “ the “ yellow fever prevailed in almost all the sea-port towns “ in the French part of Hispaniola, particularly at Cape “ Nichola Mole, where it raged so violently that it “ obliged the British to abandon the post sooner than “ they intended. About the same time it appeared in “ the harbour of St. Thomas, and was so destructive to “ foreigners, that it obtained the name of *the plague.*” The Doctor saw several cases of it in St. Domingo, during the months of August and September, 1798, and “ these were entirely confined to *American seamen*, while “ the native inhabitants of the city were totally exempt “ from it.” 2. From this very sickly coast arrived the Deborah on the eighth of July. 3. On the 12th of August John Lewis, mate of the Deborah, informed Dr. Currie, that the vessel had lost *seven* persons with fever on board during her passage, and one by accident ; and *that she had been employed as a transport in the British ser-*

vice previous to her taking in her cargo at *Jeremie*. 4. Mr. Thomas Town informed Dr. Wistar, that, on the first of August, 1798, he was told by Alexander Philips, of Water-street, that he (Mr. Philips) had brought up two or three sick people from the *Deborah*, in one or two boats. Some of them he had brought to his own house; and one was dead. Philips himself was sick at the same time, and died a day or two after. 5. Mr. Purdon informed Dr. Currie that he had a similar account from Mr. Philips, whom he saw on the first or second of August in apparent good health, and that he died on the Saturday following.

All this, and further evidence seemingly equally strong, was set aside with the greatest facility by bringing counter-evidence, particularly that of Mrs. Philips, who denied that there were any sick people in the house; and by bringing instances of the fever existing in town before the vessel arrived. It is needless therefore to trouble the reader with any further discussion of this evidence more than the rest. As the ancient Britons, in their letter to Aetius, lamented that the *barbarians* drove them to the sea, and the *sea* drove them back to the barbarians, so may we lament, in the present investigation, that the uncertainty of theory drives us to *facts*, and the uncertainty of supposed facts drives us to *theory*. Still, however, we shall not despair. The introduction of a disease into a large city is much more difficult to be traced than in a smaller one. In the year 1794 the disease appeared in the town of New Haven in Connecticut. Dr. Monson of that place informs us, that it appeared on the 10th of June, when Mrs. Gorham, residing on the *Long wharf*, was visited by Dr. Hotchkiss, who found her affected with symptoms of the yellow fever. In three days her complaints suddenly vanished, and she was supposed to be in a fair way of recovery, but the same evening she vomited matter resembling coffee-grounds, and died next day. On the same day that Mrs. Gorham died, Dr. Monson visited her niece, a girl of eight years of age, who had staid a week with her aunt, and was taken ill three days before. The day after the Doctor saw her

her she was suddenly relieved as her aunt had been, but in a few hours vomited matter like coffee-grounds, and died next day. These and some other similar cases having alarmed the select men, inquiry was made, when “ it appeared, that, in the beginning of June, capt. “ Truman arrived from Martinico, in a sloop that was “ infected with the contagion of the yellow fever; that “ this vessel lay at the *wharf*: within a few rods of Mrs. “ Gorhams residence; that she had on board a chest of “ clothes which had belonged to a mariner who died “ of the yellow fever in Martinico; and that his chest “ was carried into Mr. Austin’s store, and opened in “ presence of Capt. Truman, Mr. Austin, Henry Hubbard, and Polly Gorham: the three last died in a “ short time after their exposure to the contents of the “ chest. Hence it is highly probable that Mrs. Gor- “ ham caught the disease from the infected sloop or “ clothing. Mr. Austin’s store stands within three or “ four rods of Mr. Gorham’s house; and no person in “ town was known to have the yellow fever previous to “ capt. Truman’s arrival.”

In his further account of this fever Dr. Monson shows that it was contagious in the highest degree, and that Mr. Gorham’s house proved a kind of seminary from whence the disease spread itself. “ June 26 (says he) “ Isaac Gorham lost an infant child with the yellow fever; and soon after his son and daughter were affected “ with it: the former died. Solomon Mudge died “ on the 30th; Jacob Thomson’s negro woman on the “ 1st of July; Archibald M’Neil on the 9th; Polly “ Brown on the 3d of August; John Storer, jun. and “ John Hide, on the 8th; and widow Thomson on the “ 10th. Jacob Thomson’s negro woman, Solomon “ Mudge, John Storer, jun. and John Hide, had visited Mr. Gorham’s house a few days before their illness; Polly Brown and Mrs. Thomson nursed in Mr. “ Gorham’s family; and Archibald M’Neil nursed “ Solomon Mudge. Elias Gill died on the 12th of “ August, and Samuel Griswold’s wife on the 7th: “ the former visited Mr. Gorham’s house, the latter “ nursed in his family. “ There

“ There were a number of persons who caught the
“ disease at Mr. Gorham’s house, and recovered.

“ Mrs. Thomson, on the first day of her illness, was
“ moved half a mile from Mr. Gorham’s, into George-
“ street. Luther Fitch caught the disease from Mrs.
“ Thomson, and communicated it to his servant maid.
“ Both recovered. Mr. Fitch lives in College-street,
“ nearly three quarters of a mile distant from Mr. Gor-
“ ham’s house. I could trace the disease throughout
“ the town. No person had the yellow fever unless in
“ consequence of attending the sick, or of being exposed
“ by nurses, infected houses, clothing, or furniture.

“ I have inquired of several aged persons in this town
“ relative to the yellow fever, whether they knew of its
“ having ever been here previous to June 1794, and
“ there is but a single instance; the facts relating to
“ which are these: In the year 1743 a transient person,
“ by the name of Nevins, who came from the West In-
“ dies, lodged at the house of Nathaniel Brown, an inn-
“ keeper in this city. The man was taken very sick in
“ the night, and died shortly afterwards; and his body
“ was very yellow after death. Mr. Brown’s wife sickened
“ in a short time, and died of the same complaint, which
“ was at that time supposed to be the yellow fever.

“ I am credibly informed that several persons at Mill-
“ river, in Fairfield county, and also at New London,
“ died with the yellow fever in August and September,
“ 1795. It was propagated there by infected persons
“ from New York.

“ Capt. John Smith died in this town, the 20th of
“ August, 1795. He caught the disease in New York,
“ and communicated it to one of his negro servants.”

On the whole, Dr. Monson concludes, “ that the yel-
“ low fever is seldom or never generated in this country,
“ and that it is always imported from abroad. An ob-
“ jection to the idea of its being generated in this coun-
“ try is, that it was never known in the interior of this
“ state, or of the United States, so far as I can learn.
“ Had it ever appeared in Connecticut before the year
“ 1743, and June 1794, we should undoubtedly have
“ had

“ had some record of the fact. There is no such
“ record, and no person remembers to have heard of
“ such a disease, but at these periods, prevailing in any
“ part of the state. There are numbers of aged persons
“ in New Haven who remember the putrid ulcerous fore
“ throat, small pox, measles, dysentery, &c. raging here
“ with great mortality, but have no recollection of any
“ yellow fever. Hence we may rationally conclude that
“ it never did appear in this state but in the years 1743
“ and 1794.

“ It is evident, from facts before mentioned in this
“ letter, that the yellow fever was propagated in no other
“ way than by contagion, and that this is a *specific con-*
“ *tagion*, and no more diversified, in its operation on the
“ human system, than that of the small pox and
“ measles.

“ If the citizens of large commercial cities were atten-
“ tive in tracing the origin of the yellow fever, on its
“ first appearing among them, they would often find
“ that the disease was imported. In some instances it
“ would be extremely difficult to discover the origin.
“ But the mischief lies in this; that the inhabitants of
“ such cities, whenever a contagious disease makes its
“ appearance among them, endeavour to suppress all
“ rumour of it, from an apprehension of alarming the
“ country, and injuring their commerce; unwilling
“ to believe that there is evil in the city, till the disease
“ spreads in every direction. Then, indeed, when it is
“ too late, they are solicitous in the use of means to ar-
“ rest its progress. As it extends itself slowly at first,
“ seasonable exertion might both detect its source, and
“ prevent its increase; but when it is diffused through
“ a city, it spreads with rapidity, and it is no longer pos-
“ sible to discover where it began. But as, whenever
“ the yellow fever has appeared in the United States,
“ it has always been in sea-port towns, and originated
“ near wharves, docks, and warehouses, there seems to
“ be high probability that the disease is imported.”

The evidence here seems so strong, that no counter-
evidence that can be brought appears likely to invalidate
it.

it. The coincidence of the commencement of the fever with the arrival of the ship hath not been denied, as in other cases ; and, though it has been attempted to prove that a fever might have arisen from the quantity of putrid or putrescent matters at that time in the town, yet the circumstances of those who were present at the opening of the chest of clothes being taken with the fever, and those who were sick of it in so many cases infecting one another, cannot by any means be overthrown. But the fact is, that even those who contend most violently against importation, do yet allow that it may in some cases be so ; but they contend that if proper care be taken it will not spread. Dr. Smith in his letter to Dr. Buel says, " that infection may be brought into any place " from abroad ; that, under certain circumstances of the " place where it is introduced, it becomes very destruc- " tive ; but that, when these circumstances do not ex- " ist, however the person immediately affected, if it be " introduced by a sick person, may suffer, it is harmless " so far as the general health of that place is concerned. " If the subject were viewed in this light, as most as- " suredly it ought to be, the question of importation or " non-importation would sink into its merited insignifi- " cance." But, with due respect to the memory of Dr. Smith, this must surely be accounted a very inconsiderate mode of reasoning. In the instance he speaks of, that of the *Zephyr* lately mentioned, he allows that Dr. Treat *might* have caught the disease on board the vessel,* " but (says he) as *no other* person is known to have been " infected by that vessel, and as the Doctor communi- " cated it to no person, the advocates for importation " would not be greatly benefited by the concession." Surely we must look upon the life of Dr. Treat himself to have been a matter not entirely insignificant, and if he caught the fever by going on board, a number of others who went in full confidence of the *impossibility* of importation, might have done the same. As far therefore as the prevention of such accidents can be accounted a matter of importance, it is also of importance to believe the

* Webster's Collection, p. 98.

the doctrine of imported contagion. It is true, Dr. Smith, in the passage just quoted, adds immediately after, that "no such concession (with regard to Dr. Treat) is necessary;" but, in p. 104, he does make an ample concession, as we have seen, viz. that the contagion may not only be imported, but, under certain circumstances, *be very active and destructive*. The question therefore rests here: Can we at all times promise that, with the utmost care that can be taken, the circumstances of a place may not be such as to give activity to an imported contagion? In the nature of things it is impossible that the docks, wharves, streets and alleys of a large town can be absolutely clean. It is equally impossible that *all* men can be advised to be temperate, cleanly, and neat in their lodgings; and we are unable to determine how far people may deviate from the *rule of right* in those respects without danger. Before any theory of this kind could be supported, it would be absolutely necessary to bring an unequivocal proof that yellow fever had been in *one* instance at least produced by local causes; but this cannot be done. Among the Hottentots, the dirtiest people in the world, no such disease exists. Among the peasants of Poland, who likewise live in a very dirty manner, their mode of life is said to produce not a fever, but a disease of the hair, called the *plica Polonica*. In the Medical Repository, vol. i, p. 276, Dr. Mitchill of New York describes a disease called *elephantiasis, liketriaa, or scurvy*, occasioned by loathsome, putrefying diet, such as rotten fish, fish-livers and roe, fat and train of whales and sea-dogs, congealed sour milk, with little or no vegetable provisions, and by exposure to wet and cold. This disease prevails in Iceland, in the Ferro islands, in two districts of Sweden, and in *Madeira*; yet this disease is not the yellow fever, though it is said to make the person afflicted with it more like "a putrefying corpse than a living man." The *cold* seems to be assigned as a reason why the disease does not assume a febrile form; but, however this may hold with Iceland, it cannot with Sweden, where the summer is so hot, that the sun has been said to set forests on fire. This is probably

bably a fable ; but we are assured by Pontoppiddan, in his Natural History of Norway, a country to the full as cold as Sweden, that in summer the heat is very great. His expression is, that it is enough to “make a raven gape.” As to *Madeira*, where the climate is warm, there can be no such objection. But a particularity of this disease is, that it is infectious. Supposing then that by any means it should be exalted into a fever, have we any reason to imagine that in such a case it would lay aside its infectious property ? Surely not. If this then is the case with a disease produced by the same causes with the yellow fever, we have the very same reason to suppose that the latter is infectious, as that the former would be so if it could lay aside its present form, and assume that of fever. Another proof that mere dirtiness cannot at all times produce a distemper, or even propagate its infection, may be deduced from the sixth case quoted p. 355 from Dr. Ruffel, where he says that a poor Jewish family lived in a place such as he had always considered as one of the receptacles of contagion, yet only one in six of those who remained in it was taken with the plague. In all cases of plague, or of violent epidemic disorders, it has indeed been observed that the poor were more subject to an attack than the rich. This was so remarkable in the plague of London in 1665 that Dr. Hodges says it was called the *poor's plague* ; and Dr. Ferriar tells us from Diemerbroeck, that in some parts of Italy it was customary in the beginning of a pestilence to drive out the poor ; and likewise that this cruel expedient was used at Marseilles. The bad success of the experiment at this last place, however, shows that people of any description, and in any circumstances, may be attacked. A very probable cause, entirely distinct from any mode of living, may be assigned in this case, viz. that the poor are more exposed to infection than others, both from their circumstances and their rashness ; for it will be evident to those who converse with the most uninformed people of any country, that the Turkish notion of predestination is far from being confined to Mahometans. It is not, however, denied, that dirtiness, as well as other local

M m m

causes,

causes, may do much hurt, and occasion the spreading of a disease which otherwise would not spread; because uncleanness of all kinds seems to be the proper vehicle of infection, in which it appears to delight to take up its abode. In the Medical Extracts, vol. ii, p. 174, we have from Goldsmith the following anecdote concerning the concentration of pestilential infection in the plague of London :

“ A pious and learned schoolmaster, who ventured to
 “ stay in the city during the plague, and took upon him-
 “ self the humane office of visiting the sick and dying who
 “ had been deserted by better physicians, averred, that,
 “ being once called to a poor woman, who had buried
 “ her children of the plague, he found the room where
 “ she lay so little, that it could scarce hold the bed on
 “ which she was stretched. However, in this wretched
 “ abode, beside her, in an open coffin, her husband lay,
 “ who had some time before died of the distemper, and
 “ whom she soon followed. What shewed the peculiar
 “ *malignity* of the air, thus suffering from human mis-
 “ mata or effluvia, was, that the contagious steams had
 “ produced spots on the very *wall* of their wretched
 “ apartment. And Mr. Boyle’s own study, which was
 “ contiguous to a pest-house, was also spotted in the same
 “ frightful manner.” This shows not how infection may
 be *produced*, but how it may be concentrated in such
 miserable apartments. The appearance on the walls
 brings to remembrance what is said in the book of Le-
 viticus concerning the appearance of the leprosy in walls
 and clothes.

But, supposing we should allow that dirtiness may
 bring on a yellow fever (and it is plain that this cannot
 be proved) we have, in the case of the Busbridge India-
 man, a *demonstration* that cleanliness cannot keep it off.*
 This vessel sailed from England for the East Indies, in
 the year 1792, much about the same time that the
 Hankey sailed for the coast of Africa. She had on
 board 264 people in all, viz. 109 belonging to the ship’s
 company, 130 recruits, and 25 passengers. She had
 very

* Annals of Medicine, vol. i, p. 166.

very boisterous weather at first setting out, but crossed the equator on the 26th of May, where the weather was sultry, with heavy showers of rain. The disease now made its appearance first among the recruits, and in a fortnight spread among the ship's company. It was common for six or seven to be attacked with it daily from the commencement; "and in the space of twelve weeks "almost every person in the ship not only had laboured "under it, but many had suffered repeated relapses." For several weeks the weather was hot and sultry; but, when in the vicinity of the Cape of Good Hope, they experienced a reverse, and were driven by a storm as high as S. lat. 42. Here the thermometer indicated a temperature only 13° above frost, but no material change in the disease took place. Afterwards, when returning into the warm latitudes, they experienced the sultry heats of the Atlantic without any change either for the better or the worse, and this for no less a space than three months.

As to the origin of the disease, Mr. Bryce the surgeon, though inclined to ascribe it to contagion, could not trace it to any origin of that kind, as the vessel had been six weeks at sea before it appeared. It "could not be "ascribed to want of air or cleanliness, as *every possible* "attention had been used to preserve these: the different "apartments were thoroughly cleaned and fumigated "with wetted gun-powder; the decks were sprinkled "with boiling vinegar; and the windsails were attentively kept in order at each hatchway. Mr. Bryce is inclined to conjecture that a peculiar combination in the "circumstances of diet, situation, and state of the atmosphere, may have given rise to this calamity. But the "same combination of circumstances so frequently takes "place *without any fever*, that it appears much more "probable the disease had its origin either from an "imported *fomes*, or from a *fomes generated in some individual* in the ship, from whence it was afterwards "propagated to others by *contagion*." The disease produced on board the ship was not contagious to the people on board another vessel with whom they had communication,

communication, nor to the people ashore among whom the convalescents were put, nor to new passengers taken on board the vessel in the East Indies; circumstances certainly not a little surprising.

It doth not therefore appear, that, without the intervention of some other cause, mere dirtiness can produce the yellow fever. Let us next see what can be done by confinement, want of air, or, as it has been lately called, abstraction of oxygen. On this, however, we must observe, that in all cases where people are allowed to breathe, their lungs must be filled with the due quantity of *some* elastic fluid. If the fluid they breathe contains a smaller quantity of oxygen, it must contain a greater quantity of something else. If a disease therefore is produced, it must be occasioned by the *presence* of that other fluid, as well as by the absence of oxygen. Now, in confined air, we know that not only the oxygen is diminished, and consequently a larger proportion of azote or septon mixed with it, but in addition to this increased proportion of azote, there is also a positive augmentation of the deleterious part of the atmosphere by the effluvia from the bodies of those who are confined. These effluvia, as we have seen, p. 90, contain a great quantity of fixed air. Others have shown that they contain also azote; and it may be so; but still we are sure that the fixed air predominates. Besides this, from the breath we know that a great quantity of aqueous moisture proceeds. Experiments on the action of these different kinds of fluids are yet in an imperfect state, yet some important facts relating to them are known. 1. Oxygen breathed in great proportion produces an augmentation of heat, and proves an universal stimulant. See p. 118. By itself it quickens the pulse.* 2. Pure fixed air breathed by itself destroys life with the circumstances of increased heat, rarefaction of the blood, and rupture of the vessels. See p. 206. 3. The circumstances attending death by breathing azote are not particularly recorded;

* In the Medical Extracts we find it recorded, that a young gentleman having breathed pure oxygen for several minutes, his pulse, which was before 64, soon beat 120, in a minute.

ed ; but we know that by breathing an atmosphere lowered by it the consumptive fever is not increased, but diminished ; and there is an account in the Medical Annals of a person who was perfectly cured of a consumption by the smell of the bilge-water of a ship. 4. It has formerly been shown, from Dr. Black's experiments, that, when the vapour of water is condensed in the body, a great quantity of heat must be thus communicated to it. In confined air therefore there is a diminution of the oxygen which produces heat ; but there is an augmentation of the fixed air and of the aqueous moisture which increases it ; so that, on the whole, the balance must be considered as in favour of the augmentation of heat in the human body ; not to mention the quantity of sensible heat continually added to the atmosphere by that which evaporates from the body. This position, however, doth not stand upon the uncertain ground of theory ; it is confirmed by the following remarkable fact : Commodore Billings, who commanded a Russian expedition fitted out by the late empress, found, in his travels through the northeastern part of Asia, that the cold of the atmosphere exceeded not only what was known in other climates, but even what most people had been able to produce by freezing mixtures. Dr. Guthrie informs us that he was unable to produce a greater degree of cold than 36 below 0 of *Reaumur*, though assisted by 20 below 0 of natural cold, and the power of all the freezing mixtures he knew. " How much then," (says he) was I surprised to hear Mr. Billings assert, " that some spirit thermometers which he had with him, " graduated according to *Reaumur's* scale, were often as " low as 40° below the freezing point of water, that is, " 8 deg. below the freezing point of mercury. And " once or twice he observed them at 42 deg. below the " *freezing point of quicksilver.*" " During

* This account is taken from the Annals of Medicine for 1798, and appears in a letter from Dr. Guthrie at Petersburg to Dr. Duncan at Edinburgh. It is drawn up with such *astonishing* inaccuracy, that we may well be surprised how the one physician should write, and the other print it. There seems in the first place to have been a mistake of Reaumur's thermometer for Fahrenheit's. But even this will not rectify the account. The zero or (0) on Reaumur's scale is the freezing point of water ; on Fahrenheit's it is the cold produced

" During this severe cold (probably 42 below 0 of
 " Fahrenheit) the Nomade Tchutski (a wandering na-
 " tion on the northeastern extremity of the Asiatic con-
 " tinent) who were conducting him along the coast of
 " the Frozen ocean, in sledges drawn by rein-deer, en-
 " camped every night on the frozen snow in low tents,
 " which they quickly formed with the skins of rein-deer,
 " spreading some of them on the surface of the snow, on
 " which they all slept; and he assured me, that, so far
 " from suffering from cold during the night, the heat
 " was so excessive in these fur tents, where from ten to
 " fifteen slept together, according to its dimensions, that
 " no one could bear even a shirt; but all lay in a vio-
 " lent perspiration, naked as they were born, till dawn
 " of day, without the aid of fire, excepting a train-oil
 " lamp, which lighted each tent."

From this account it seems pretty evident, that, by
 the accumulation of animal effluvia, a heat may be com-
 municated to the atmosphere greater than that of the
 human body. We cannot suppose the heat of the tent
 which put the people in a violent perspiration to have
 been less than 90° of Fahrenheit; and, supposing the tem-
 perature of the external atmosphere to have been at a
 medium 30° below 0, there must have been a genera-
 tion of 120 degrees of heat; but the heat of the human
 body does not exceed 97 degrees, and it cannot com-
 municate more heat than it has. But we must suppose
 the tents to have been capable, had they been filled to
 the top, of containing twice the number who did sleep
 in them. They could communicate to the air therefore
 only

duced by a mixture of salt and snow, 32 degrees below the freezing point of
 water. The freezing point of quicksilver has been fixed at 39, 39½ or 40
 degrees below the cold produced by salt and snow. When the thermometer
 therefore fell to 40 deg. below the freezing point of water, it was only eight
 degrees below the cold of salt and snow, and not equal to the congela-
 tion of mercury by more than thirty degrees. The difference between this
 and *forty-two* degrees below the freezing point of quicksilver is enormous
 and incredible. It indicates a degree of cold hitherto unobserved on the face
 of the earth, and scarcely equalled by the latest experiments made at Hud-
 son's bay, where, by means of vitriolic acid and snow, the thermometer was made
 to indicate a degree of cold 40 degrees below the freezing point of quicksilver.
 The inaccuracy and confusion of this account, however, does not affect the
 subsequent part relative to Mr. Billings's journey.

only one half of 97 degrees, or $48\frac{1}{2}^{\circ}$; the remaining $71\frac{1}{2}^{\circ}$ therefore must have been derived from the breath and perspiration of the body.*

Let us now attend to the consequences which must naturally and undeniably follow from this fact. If, in such a violently cold climate, the effluvia of fifteen human bodies could produce a heat sufficient to induce a violent perspiration, what would they not have done had they been in a climate where the heat of the atmosphere was upwards of an hundred degrees greater, or between 70 and 80 above 0 of Fahrenheit? Perhaps this was never thoroughly tried except in the black hole at Calcutta. Here an hundred and forty-six men and one woman were enclosed in a dungeon only 18 feet square, and consequently affording scarce eighteen inches square to each. This happened in a very hot climate, in the month of June; so that we cannot suppose the temperature to have been less than 80° of Fahrenheit.

On being confined in this manner, the vital powers endeavoured, by a most profuse perspiration, to send off the superfluous quantity of heat thrown into the body. This was exactly what took place with Dr. Guthrie; but, in the case of the black hole, there was, besides the quantity of heat produced by the warmth and perspiration of the body, *an hundred and ten* degrees more to be added, on account of the natural heat of the atmosphere. For we cannot suppose the heat at Calcutta, in a sultry evening in the month of June, to have been less than 80, which added to —30, supposed to be the temperature among the Tchutski, makes 110° . The perspiration was extremely profuse, and was soon accompanied with excessive thirst; nature being unable to supply such a quantity of liquid, or this liquid to carry off the heat from the body. The want of pure air began then to be felt by a difficulty of breathing; and Mr. Holwell, having in despair retired from the window, found the difficulty of breathing increase, attended by a palpitation of the heart. Aroused by his sufferings, he returned and was relieved by

* Here no account is made of the heat that the very cold snow upon which they lay must have absorbed, which we know must have been very considerable, though it cannot be calculated.

by drinking some water, and having air at the window. The difficulty of breathing diminished, and the palpitation ceased; but, finding the thirst not to be quenched by water, he sucked his shirt-sleeves, which were wet with sweat, and endeavoured as much as possible to catch all of it that he could. The taste was soft and agreeable. A pungent steam was now felt like spirit of hartshorn. A number had died, and Mr. Holwell, once more rendered desperate, retired from the window, and lay down upon a bench, where he soon lost all sense. Next morning only 23 survived, of whom Mr. Holwell was one. He revived on being brought out to the fresh air, but was instantly seized with a putrid fever, as well as all the rest of the survivors. In this situation they were obliged to walk, loaded with fetters, to the Indian camp; at night they were exposed to a severe rain, and the day following to a sultry sun; yet, notwithstanding this ill treatment, they all recovered; having an eruption of large and painful *boils* all over the body. Mr. Holwell, however, said that he never afterwards enjoyed good health.

Another melancholy proof of the bad consequences resulting from a want of fresh air we have in the evidence given by Dr. Trotter, when the question concerning the slave trade was agitated before the British House of Commons. He deposed that the slaves were confined 16 hours out of 24, and permitted no exercise while on deck. They were kept in rooms from 5 to 6 feet high, imperfectly aired by gratings above, and small scuttles in the sides of the ship, which could be of no use at sea. The temperature of these rooms was often above 96 of Fahrenheit, and the Doctor says that he never could breathe in them, unless just under the hatchway. “I have often (says he) observed the slaves drawing their breath with all the laborious and anxious efforts for life which are observed in expiring animals subjected by experiment to foul air, or in the exhausted receiver of an air-pump. I have often seen them, when the tarpaulings have been inadvertently thrown over the gratings, attempting to heave them up, crying

"ing out, in their own language, 'We are suffocated!'
 "Many I have seen dead, who, the night before, had
 "shown no signs of indisposition; some also in a dying
 "state, and, if not brought up quickly on the deck,
 "irrecoverably lost. Hence, in one ship, before her ar-
 "rival in the West Indies, out of 650 slaves, more than
 "50 had died, and about 300 were tainted with the
 "sea scurvy."

A third example of the effects of want of air, though conjoined with other causes, may be reckoned the case of the Hankey, formerly related. The people there were not indeed confined as much as in the black hole, but it is impossible to suppose that there could be a proper circulation of air, and the length of time the passengers were confined might be equivalent to the violence of the cause in the case of the black hole. In the latter, however, the disease produced was not the yellow fever, but seems to have been a kind of non-descript eruptive one, more resembling the small pox, or rather *Job's disease*, than any other. From Dr. Chisholm's account of the Boullam fever also, it seems to have been more of an eruptive nature than the common yellow fever; so much, that Dr. Chisholm is of opinion that it partook "in no small degree of the nature of the true plague." He says that in it he "did not observe *carbuncles* on any who died; but that in many who recovered they were numerous, large, and very troublesome." He considered them also as a critical discharge, and the *only* one in this fever; but in the plague they certainly are not; neither is it at all probable that they were of the same nature with the pestilential carbuncles.

In p. 207 of this treatise it is inferred, from some experiments of Dr. Davidson and Dr. Chisholm, that the fevers in warm climates *are not* owing to a deficiency of oxygen in the atmosphere; but in a treatise on the yellow fever in Dominica by Dr. Clarke, we have other experiments, which, if they can be depended upon, certainly overthrow that doctrine, or at least render it very dubious. Dr. Clarke endeavoured to ascertain the purity of the air by Mr. Scheele's apparatus, and which was

N n n

likewise

likewise used by Dr. Davidson, viz. filling gallipots with flowers of sulphur and iron filings well mixed and moistened, and putting these upon a stand under a glass vessel, which was placed on a stool in a pail of water. The glass vessel was marked and divided on the outside, and, allowance being made for the space occupied by the gallipot, the water rose only one fifth in the glass vessel, after standing 24 hours. When the disease abated, it rose near one fourth; and upon many trials afterwards it never rose above one fourth. When the emigrants fled towards the mountains, where the air is very pure, they always avoided an attack of fever, or soon recovered if in a convalescent state. This is similar to what is stated by Van Swieten concerning the plague at Ocza-kow, viz. that the atmosphere was so loaded with some kind of vapour, that in certain parts of the town polished sword-blades were turned black. This seems to have indicated a great prevalence of inflammable or hepatic air, or both, in the atmosphere; but it is extremely doubtful whether this could produce a *fever*, much less the true *plague*. In Dr. Clarke's experiments it were to be wished that he had examined the nature of that part of the atmosphere which was left after the absorption of the oxygen. It is by no means probable that at any rate the addition of a fifth part of azote could have rendered the air so unwholesome; and besides, we are entirely at a loss whence to derive such an immense quantity; for certainly the quantity of air which surrounds us, even for a few miles extent, is so great, that any considerable alteration in its composition could not take place without a very evident cause. The probability therefore is, that the experiments did not give an accurate statement of the quantity of oxygen contained in the atmosphere. Experiments on this subject must always be uncertain; and of all the modes of trying the qualities of the air, perhaps that with sulphur and iron filings is most liable to variation. It may vary, from the nature of the sulphur,* from the cleanness or the impurity

* If sulphur be a *simple* substance, as the new chemists pretend, there ought never to be any variation in its properties, except what arises from mere impurity;

rity of the iron filings, or lastly from the accuracy of the mixture. It is also a misfortune in this case, that though a great absorption proves the existence of a large quantity of oxygen in the atmosphere, yet a small one does not prove the contrary; for it is more reasonable to suppose that we have failed in our experiment, than that the constitution of the atmosphere has changed. Dr. Clarke's experiments therefore cannot prove any thing, until more accurate methods of investigating these things be found out.

We must now proceed to investigate a third cause assigned for the production of fever, and that is the putrefaction of animal and vegetable substances. This hath been very much insisted on. Dr. Rush ascribes the fever of 1793 to the exhalations of putrid coffee, but allows also the distemper to have been contagious, and says, that "for several weeks there were two sources of infection, viz. exhalation and contagion. The exhalation infected at the distance of three or four hundred yards, while the contagion infected only across the streets. The more narrow the street, the more certainly the contagion infected. Few escaped it in alleys. After the 15th of September the atmosphere of every street was loaded with contagion; and there were few citizens in apparent good health, who did not exhibit one or more of the following marks of it in their bodies: 1. Yellowness in the eyes, and fallow colour on the skin. 2. Preternatural quickness in the pulse. 3. Frequent and copious discharges by the skin of yellow sweats. 4. A scanty discharge of high-coloured or turbid urine. 5. A deficiency of appetite, or a preternatural increase of it. 6. Costiveness. 7. Wakefulness. 8. Head-Ach. 9. A preternatural dilatation

rity; but the following is a remarkable instance to the contrary: Dr. Crawford (brother to the celebrated Adair Crawford) informed me, that for his oil of vitriol works at Lisburn, in Ireland, he had purchased *five tons* of sulphur produced from copper mines in the island of Anglesey. The sulphur looked well, and was not more impure than what he commonly used; but, on trial, the produce of acid fell so much short of what he had been accustomed to receive, that it would not afford the expense of manufacturing. An experiment on such a large scale could not be erroneous. If sulphur is a simple substance, the fact is unaccountable: if it is composed of phlogiston and acid, an over proportion of the former will easily account for it.

“tion of the pupils. . . . Many country people who
 “spent but a few hours in the streets in the day, in attend-
 “ing the markets, caught the disease, and sickened and
 “died after they returned home ; and many others, whom
 “business compelled to spend a day or two in the city
 “during the prevalence of the fever, but who escaped
 “an attack of it, declared that they were indisposed
 “during the whole time with languor or head-ach.”

Thus, according to our author, the fever of 1793 *be-*
gan from putrid effluvia, and *was continued* by contagion.
 But many attempts have been made to prove that
 putrid effluvia *alone* both begin and continue it. The
 limits of this treatise would not allow (even were it but
 beginning) of a particular account of all that has been
 said upon the subject ; neither indeed is it needful. A
 single well attested instance would decide the matter ;
 but we have already seen the difficulty of procuring that
 instance on either side. Certain it is, that we have in-
 stances of the yellow fever arising where it is not pretend-
 ed that there was any considerable collection of putrid
 matters. In the Medical Repository, vol. ii, p. 149, we
 find an account of the yellow fever appearing “in a coun-
 “try village, near a fresh river, *on low marshy ground*, seven
 “miles from Portland, so that no suspicion could arise
 “of the disease being imported. *Several other cases of*
 “*yellow fever occurred in different parts of the coun-*
 “*try.*” This stands on the authority of Dr. Jeremiah
 Barker of Portland, so that there can be no doubt of its
 authenticity ; and though it cannot prove that the yel-
 low fever *may not* arise from putrid effluvia, yet it cer-
 tainly shows that it *may* arise without them. It
 does the same with marsh effluvia ; for though we may,
 in the case of the village, suppose that the marshy ground
 on which it stands occasioned the disease there, yet what
 shall we assign as the cause of its being dispersed in dif-
 ferent parts of the country, where there were neither
 marshes nor rotten beef ? The proofs indeed of animal
 effluvia being the cause of yellow fever are so equivocal,
 that Dr. Davidson* supposes putrid *vegetable* matters to
 be

* Medical Repos. vol. i, p. 170.

be more active in this way than the former. For this supposition he gives as a reason, that Dr. Rush has observed, that butchers, and those who lived in the neighbourhood of shambles, scavengers, grave diggers, and others of similar employments, escaped the yellow fever in Philadelphia. These, the Doctor justly observes, were more exposed to what he calls the *gazeous oxyd* of azote, than any other class; and he likewise takes notice, that sailors, who during long voyages feed on putrescent food, which might be supposed to produce a great quantity of this acid, are thence subject to scurvy, a disease not only different from fever, but entirely opposite to it. This exemption of people conversant among the dead has been also taken notice of by Dr. Mitchill,* who brings as an argument against the contagious nature of the disease, that “seven men belonging to the almshouse of New York were employed, during the whole of the sickly season of 1798, in putting the persons dead of the plague (yellow fever) into coffins, and though they handled in the course of their service upwards of *five hundred* corpses, in different stages of putrefaction, and though they were much incommoded with the pestilential quality of the air in the rooms they entered, and frequently were obliged to vomit, not one of them was so much indisposed, during the whole season, as to discontinue his employment.” This is no doubt a very remarkable fact, but in the present instance it proves too much; for if, from it, we conclude that the disease is not contagious, we must also conclude that it cannot be produced by putrid animal substances. Yet in the very next sentence Dr. Mitchill assures Dr. Currie, “that exhalations from corrupting *beef* and *fish* have excited sickness as malignant, and as deadly, as any which has occurred.” If exhalations from putrefying beef and fish have produced this sickness, why did not exhalations from putrefying *human bodies* do the same? and if we are assured that the latter *did not*, we have as little reason to suppose that the former *did*; unless we establish a difference between the corrupting flesh of one animal

* Medical Repos., vol. ii, p. 313.

animal and of another, which no experience hath countenanced in the least.

The exemption of those employed in burying the dead, even in the true plague, is observable. Dr. Canestrinus supposed it might be owing to the use of garlic, which they were wont to bruise and rub their hands, face and breast with, and likewise to chew, before they entered into an infected house; but this cannot be supposed a very powerful antidote. Dr. Rush is of opinion that grave diggers escaped in Philadelphia by the circumstance of their digging in the earth; and he says also that scarce an instance was heard of those employed in digging cellars being attacked with the disease. "There seems to be something (says he) in the fresh earth, which attracts, or destroys, by mixture, contagion of every kind. Clothes infected by the small pox are more certainly purified by being buried under ground than in any other way. Even poisons, are rendered inert by the action of the earth upon them. Dogs have long ago established this fact, by scratching a hole in the ground and burying their limbs or noses in it, when bitten by poisonous snakes. The practice, I am told, has been imitated with success by the settlers upon new lands in several parts of the United States."

This reason is very plausible for the exemption, of such as work in the ground, from contagion; but it cannot do for scavengers and butchers, who by the nature of their employment are frequently exposed to steams from the vilest matters. We may, on the contrary, derive from thence a very strong argument that these steams are by no means essentially connected with contagion. We have already seen from Dr. Fordyce (p. 169 of this treatise) that contagion or infection is not the object of sense. Dr. Rush, though he doth not absolutely say that the contagion of the yellow fever hath no smell, yet informs us, that "the smell of the contagion, as emitted from a patient in a clean room, was like that of the small pox,* but in most cases of
" a less

* Account of the Bilious Yellow Fever, p. 107.

“ a less disagreeable nature. Putrid smells in sick
“ rooms were the effects of a mixture of the contagion
“ with some filthy matters. In small rooms, crowded
“ in some instances with four or five sick people, there
“ was an effluvium that produced giddiness, sickness at
“ the stomach, a weakness of the limbs, faintness, and,
“ in some cases, a diarrhœa. The contagion adhered
“ to *all kinds of clothing*. It was in no instance commu-
“ nicated by paper.” From so great authority we may
certainly conclude that, *according to the best observation*,
there is an *essential difference* between the contagion of
a disease and the effluvia of a putrefying carcase; and
that, though the latter may be the vehicle of the for-
mer, and may increase its virulence, either by being partly
assimilated to its nature, or by affording it a proper *nidus*
for concentrating itself; yet that originally the one is
not the other; and, though contagion may bring on a
fever without putrid effluvia, yet putrid effluvia cannot
do so without contagion. With regard to pure conta-
gion, I shall here, to the evidences already produced,
subjoin the testimony of Dr. Davidson, formerly quoted.
“ I must declare* (says he) I have seen the disease evi-
“ dently propagated in this way (by contagion;) but in
“ many instances it could not be traced. I have known
“ three cases of the fever brought on by persons bathing
“ in the sea along side the vessel, some distance from the
“ shore, and neglecting to dry themselves properly af-
“ terwards. The semina of the disease were here pre-
“ sent, and, like the electrical jar charged, required
“ only the approach of a conductor.” This shows an
amazing subtilty and diffusibility in the contagion,
scarcely indeed credible, if it were not known to be
equally subtle in other cases. In the correspondence
between Dr. Haygarth, of Chester in England, and Dr.
Waterhouse, professor of medicine at Cambridge near
Boston, the latter informs us, from Dr. Rand, that by
burning, in a field near Charlestown, the bedding, fur-
niture, &c. belonging to a person who had been ill of
the small pox, the people who lived in the wake of the
smoke

* Med. Repos. vol. i, p. 171.

smoke proceeding from it were attacked with the small pox, and the disease spread. This is similar to an observation formerly quoted from Huxham ; but the following are much more remarkable : “ A vessel arrived at
 “ Charlestown from Lisbon, laden with salt, and lemons
 “ in boxes.* A person had the small pox on board,
 “ and the small pox officers would not suffer the lemons
 “ to be sold, without being first unpacked and the paper
 “ surrounding each lemon taken off. These papers were
 “ kept by themselves in a storehouse for several weeks ;
 “ and after this, by order of the overseers, they were
 “ brought out and burnt ; when, of two children playing
 “ round the fire, one, named Manning, took the
 “ disorder, and broke out at the usual time. . . .

“ Dr. Rand was called to a lady, whom he found hot
 “ and feverish with a violent pain in her head and back ;
 “ but he had no suspicion of the small pox. He bled
 “ her, and a Mrs. Brandon held the vessel to receive the
 “ blood, some of which spirted on her hand and arm.
 “ Next day the small pox appeared on the lady who
 “ was bled ; and she was of course immediately separated
 “ from Mrs. Brandon ; notwithstanding, in twelve or
 “ fourteen days, Mrs. Brandon was seized with the
 “ small pox, and died. Several other persons present
 “ were also liable to the infection, yet no one took the
 “ disease but this woman, who stood over the blood
 “ while it was running, and received some on her arm,
 “ except Mrs. Benjamins, to whom the basin of blood
 “ was handed over the bed, who also took the small pox
 “ from the effluvia of the blood. The same physician
 “ was called to the child of Manning (who was supposed
 “ to have taken the small pox from the burning of
 “ lemon-papers as aforesaid ;) he found the child bleeding
 “ at the nose in its mother’s lap, who was then in
 “ the ninth month of her pregnancy. The next day
 “ the small pox appeared on the child, and it was of
 “ course immediately separated from its mother and all
 “ the family ; nevertheless, in about fourteen days the
 “ mother was seized with the disorder, and not long
 “ after

* Haygarth’s Sketch of a Plan to exterminate Casual Small Pox, vol. ii, p. 270.

“ after delivered of a dead child, which child *had distinct eruptions over its whole body.*”

These facts are of the utmost importance in determining the nature of contagious diseases. In conjunction with others, they show that such diseases originate in the blood, and from thence are communicated to the rest of the body. They show also, that the contagion is in all cases truly *specific*, and *immutable*. Thus the contagion of the small pox, whether existing in the matter of a pustule, in the smoke of burning clothes or paper, or in the effluvia of blood, is invariably the same, and never produces any other disease. It is the same whether applied to the human body, or to that of a brute animal; of which we have a remarkable instance in the Medical Repository, vol. i, p. 258. “ A peasant of the county of Essex, in England, seeing a great many children carried off by the natural small pox, was desirous of inoculating his two boys; one nine, and the other twelve years old. Not being able to employ a surgeon, he collected the scabs of a child then sick of the disease, powdered them, and sprinkled the powder upon slices of bread and butter. The two sons ate them, and gave a bit to the house-dog. They had a mild small pox, and got well without any remarkable accident. The dog remained sick for two or three days, drank a great deal, and refused to eat: on the fourth he had a very decided variolous eruption: on the ninth the pustules were full ripe, and dried up and fell off like those of the two children. An English author says he has seen the same epidemic in a flock of sheep, the greater part of which were infected, and communicated it to two cows, one of which died. The symptoms that manifested themselves in these animals in the course of the disease were in every respect the same as in the human species.”

This instance, partly quoted in the former part of this treatise, likewise is a strong proof of the contagion of small pox being first communicated to the blood; for, by swallowing it along with the aliment, it would, in the common course of digestion, be absorbed by the lacte-

als, and enter the blood with the chyle. The experiments with dogs made by M. Deidier, of which an account is given p. 268, show that the contagion of the plague is equally specific with that of the small pox; and we see that it acted in all cases in which it was tried by being mixed with the blood. Being thus first mixed with the blood, it is plain that the contagion must have passed from this fluid to all the other parts of the body; and, if diseased blood is capable of communicating its disease to all the sound parts of the body in which it circulates, we must own that this strongly corroborates Dr. Waterhouse's suspicion, "that the blood is capable of producing the infection before the disease is so far advanced as to be apparent on the surface." If the disease originates in the blood, the latter should indeed seem more capable of communicating it at first than afterwards; because we must suppose that the diseased parts would be thrown off to the surface, and so pass off altogether. On this subject Dr. Waterhouse also quotes the opinion of Dr. Holyoke of Salem, "who, for his learning, professional abilities and integrity, is justly esteemed one of the first physicians in this country, and whose extensive practice has afforded him ample experience in the small pox." He writes to Dr. Waterhouse, "that, although he has reason to believe that an infected person seldom gives the disease till after the eruption is considerably advanced, yet there are facts which make it probable that it is sometimes communicated earlier."

In the same letter Dr. Waterhouse gives other instances of the inconceivable subtilty of variolous contagion, no less remarkable than those already mentioned. One is of Dr. Brattle, who, having visited patients infected with the small pox, "used the common precaution of covering his clothes with a loose gown, &c. but neglected his *zeig*. In consequence of this small neglect, after riding six miles on horseback, he gave the disease to a person in a room through which he passed, where he did not stay to sit down." Another is, if possible, still more remarkable: "David Anthony, esq. one of
" the

“ the overseers of the small pox in Rhode Island, after
“ going into the hospital, and using the common pre-
“ cautions, neglected to *smoke his wig*. In his way home,
“ two miles from the hospital, he called at the house of
“ his daughter. He did not dismount, but sat on his
“ horse, and talked to her through an open window;
“ and, at the common period (by which we usually un-
“ derstand about fourteen days) she took the disease
“ and died. Many such instances, adds the Doctor,
“ could I relate, where wigs have given the infection,
“ after being exposed to the open air during the passage
“ of several miles.”

From all this it appears how difficult a task they undertake who contend for the domestic origin of the yellow fever, without contagion. In all cases they must have recourse to something visible and obvious to the senses. Thus putrid beef, putrid fish, ponds of water, marshes, &c. are all easily seen, and we are able to prove their absence as well as their presence. But we certainly know that the yellow fever has arisen where none of those supposed causes have existed, as in the *Busbridge Indiaman*; and, on the other hand, all the supposed causes have existed without the production of any fever. Of this last Dr. Chisholm, in the conclusion of his defence against Dr. Smith, gives the following remarkable instance: * “ During a considerable part of the years
“ 1776 and 1778 my duty led me very much to reside
“ in New York; and during my residence, particularly
“ in the summer and autumn of 1778, which were re-
“ markably hot, and insufferably so in the lower streets
“ of New York, no disease of a very alarming nature, and
“ none which assumed the form of an epidemic, appeared
“ among the troops or inhabitants. The smell from all
“ the ships, and from those in particular delineated by
“ Dr. Seaman (who has written a treatise on the sub-
“ ject) was in the highest degree offensive. The police
“ at that time was by no means strict: putrid substan-
“ ces of every description were accumulated in the ships,
“ and

* Med. Repos. vol. ii, p. 291.

“and in many parts of the city unconnected with wharves, and yet no disease was the consequence.”

Some particulars above related may perhaps appear, to those who deny the existence of contagion, in rather a ludicrous point of view. It is indeed too common for people to laugh at what they cannot answer; but if we consider the instantaneous and inexplicable action of the poison of serpents, and in how little time they produce a mortal disorder, or even death itself; when we consider that contagion is only a volatile poison, and that it for the most part takes up an incomparably longer time to bring on death than the bites of some venomous animals; we cannot be surprised that a quantity of this volatile matter inconceivably less than that of animal poison should be capable of bringing on the disorder; for the length of time may be supposed to make up for the deficiency of quantity. Yet, if we consider the extreme activity of some animal poisons, the wonder at the small quantity of contagion necessary to produce a deleterious effect will in a great measure cease. In the former part of this treatise it has been observed, from Dr. Mead, that the whole quantity of poison emitted by a viper, when it bites, does not exceed the bulk of a *good drop*. An ordinary drop from a vial weighs half a grain, so that we cannot suppose a large drop to be more than a whole grain. But there are instances in which effects equally deleterious are occasioned by the bites of animals the whole bulk of which is scarcely equivalent to that of the poison of the viper. In the northern climates of the Old World, *spiders* do not grow to any remarkable bulk, yet the bite of the poisonous spider of Russia is as mortal as that of the rattlesnake.* The effect of the *furia infernalis* of Linnæus is still more to our purpose. It is an insect found in the forests of Kemi in Lapland, and likewise in Sweden and Russia; and, if we can give credit to Mr. Pennant, in some of the Western Islands of Scotland. This insect falls down out of the air, and, if it happens to light upon any uncovered part of the human body, it almost instantly penetrates down
to

* See Medical Annals, vol. iii, p. 400.

to the bone, occasioning the most excruciating pain, and death in a *quarter of an hour*.^{*} Now, should we suppose the whole body of this insect to be poison, as it is probable that it is not, it is so minute, that though the whole were volatilized into contagion, it might be well supposed to adhere to a *twig*, or even a more diminutive part of the clothing; and, considering the virulent effects of even this small quantity of contagion when concentrated, it would easily follow by fair calculation, that a very *minute proportion* of even this *small quantity* might bring on a dangerous disease.

Lastly, it may be urged on the side of contagion that, when a vessel arrives from a sickly country, it is no proof that she has not brought a disease with her, that the people aboard are in health. There is abundance of evidence

^{*} The following account of the poisonous insects of Russia, extracted from Dr. Guthrie's letter to Dr. Duncan (Med. Annals, vol. iii, p. 396) may be not unacceptable to the reader: "I have lately seen (says Dr. Guthrie) a woman with her hand and arm in a most violent state of irritation, from the lodgement of the *lumbricus melitensis*, a worm not much thicker than a horse-hair, which had entered her thumb whilst at work in a marshy spot, and was, when I saw her, a day after the accident, on its way up the arm, with excruciating pain. I must own that I should not have known the nature of the disease, if a fellow-peasant had not immediately declared that it was produced by the dangerous worm; which many of these people are acquainted with to their cost, as an inhabitant of the stagnant pools and marshes in that district, about sixty versts to the southwest of Petersburg. I must farther acknowledge, that I was happy to hear the patient was to be instantly transported to another village, where a famous operator lived, well skilled in the art of extracting the venomous insect; as I should certainly have gone very awkwardly to work if I had been obliged to operate: though the simple peasants perform it with success and safety, gradually winding the worm round a quill, till the whole animal be extracted; a work of much patience and perseverance. I was very sorry that duty obliged me to be in town the same evening, a drive of sixty versts. It was therefore impossible for me to accompany the patient, though I was very desirous of witnessing this village-operation.

"But Russia is pestered with a still more dangerous worm; the *furia infernalis*. It is still smaller than the former, not being thicker than a human hair. This infernal insect, from its extreme lightness, is often carried up into the air, with the dust, by whirlwinds; and, if it unfortunately falls on the uncovered part of a man or beast, it enters the flesh in an instant, and soon proves mortal, if a remedy be not quickly applied.

"Our new vice-governor of Petersburg lately came down from Siberia, where he was commandant of a fort. He tells me, that in the district of Nerchinsk, where he commanded, the peasants, as well as their cattle, are often destroyed by an insect falling upon them. To prevent this accident from proving fatal, the part is instantly scarified, and rubbed with a mixture of snuff and sal ammoniac.

"This I am convinced must be the *furia infernalis*; more especially as he assured me, that the insect was so very minute, that none of the peasants had ever seen it when it fell upon them, and that they had no idea of its

"nature

dence that very dangerous maladies may be communicated by those who do not labour under the same. The prisoners at the Oxford assizes were not sick at the time they communicated a dreadful distemper to those around them. Dr. Brattle and Mr. Anthony were in perfect health when they communicated the contagion of the small pox, yet the effect was not less fatal. In short, *contagion* being a power certainly known to exist, though invisible and imperceptible, it is impossible ever to prove that it is absent; neither after the contagion of any disease has once got into a country can we be assured that it may not revive. The experience, we may say, of the whole world testifies that it does adhere particularly to clothing. Dr. Lind thinks it may adhere to the timbers of

“ nature and form. But one circumstance of his, recited, almost staggered my belief; that the carcase of an animal killed by this insect is almost as dangerous as the insect itself. This phenomenon I cannot account for in any other way but by supposing, as the accident always happens in the hot months of the year, that a high degree of putridity is produced by the venomous worm, when the case proves fatal.

“ I informed the vice-governor of the manner in which the Dalecarlian peasants in Sweden treat the accident, in order that he might communicate their mode of cure to his Siberian acquaintance, which is merely applying to the part affected a piece of sweet curd. The insect possibly prefers this to flesh, and leaves the one for the other. I am, however, much afraid that this simple remedy will seldom be at hand in Russia, as the peasants are unacquainted with the use of rennet, but prepare a sour curd by means of heat, throughout the whole empire; evidently taking its origin in the Tartar Koumis, and shewing them to be a people of Scythian extraction. They likewise separate butter from milk by heat, instead of the churn; a curious circumstance, probably unknown to you before.

“ These two dangerous insects are, however, not all which threaten the life of man in this empire: the southern provinces are infested with a third, the bite of which is as mortal as that of the deadly rattlesnake, if the part be not instantly scarified, and rubbed with fresh butter. This is a species of crab-spider, the phalangium acaroides, resembling the tarantula, but rather thinner and smaller. It however kills and devours that formidable spider in a few minutes, which, when compared with it, is an innocent animal.

“ Your acquaintance, Mrs. Guthrie, lately returned from a tour on account of health, along the north shore of the Black Sea. Among much important and curious information, she gave me some account of the cure employed for the bite of this mortal spider, which finds many lurking-places among the ruined buildings of the ancient Chersonesus Taurica, or Crimea, laid waste in the last Turkish war. It is a curious fact, that animal oil counteracts the venom of the spider tribes, as vegetable oils do the venoms of serpents. I suspect, however, that either of them would counteract both poisons; indeed, I think we have a proof of animal oil acting wonderfully on serpents, in the anecdote related by Bruce, when the deadly cerastes, or viper of the Nile, turned away its head from the oily breast of the prime minister of Fenzar, when he carelessly took it up in his hand, and applied it to his naked bosom, to shew Mr. Bruce how innocent it was to men of his colour, whose very skin sickened the animal, and made it avoid all contact.”

of ships ; and there is the greatest reason to believe that it may also adhere to the walls of apartments in houses. The appearance of fever therefore without any new importation cannot prove that it has not arisen from contagion. But it is now time to state the evidence on the opposite side.

In Webster's Collection we find the domestic origin of yellow fever supported by Drs. Valentine Seaman, and E. H. Smith of New York ; and by Drs. Taylor and Hansford, and Dr. Ramsay of Norfolk. Dr. W. Buel of Sheffield has also given an account of a fever, but so unlike that of which we treat, that what is said of the one cannot be applicable to the other.

The arguments used by Dr. Seaman are, 1. Several persons were infected, who had taken the utmost care to avoid all communication with the sick, who had not been for several weeks out of their houses, or within *eighty* feet of an infected person. 2. The nurses and attendants in some places were infected, but in others generally escaped. Neither did the disease spread into the country, as was reported ; the Doctor having inquired into these reports, and found them groundless. 3. Dr. Lining says in his letter to Dr. Whytt,* " If any person from the country received it in town, and sickened on his return home, the infection spread no further, not even to one in the same house."†

Several other arguments of the same negative kind are adduced, which, being not essentially different from those already quoted, it is needless to detail. The following are rather of a different nature : 4. Some contagions are propagated by contact only, others at a distance ; but at any rate we may suppose that contact will propagate contagion more readily and more powerfully than any other mode that can be imagined. Yet multitudes of dissections have been made, and those who made them are still alive. 5. " Specific and acknowledged contagions all seem to arise from themselves only : hence
" it

* See p. 387.

† The same physician, in the very letter quoted by Dr. Seaman, says that all the times this fever had appeared in Carolina, the origin of it was evidently traced to some vessel arrived from the West Indies.

“ it would be almost as hard for me to believe that the
 “ siphylis, small pox, or measles, could be produced
 “ from any other cause than their own proper virus, ob-
 “ tained from persons affected with the like disease, as
 “ it would be for me to conceive of the formation of a
 “ plant without its having received its seed, or *radical*,
 “ from one of the same nature.* Contagions seem to
 “ fix in the soil of our bodies, and there seed, as natu-
 “ rally and regularly as vegetables do on the earth. But
 “ the yellow fever has been produced from *other causes*
 “ *than contagion*.† Does it not then admit of a doubt,
 “ whether it *can possess* a power of propagating itself?”
 7. Contagions respect no persons, but all of every clime
 and colour are equally attacked with them; but the
 yellow fever is known to attack some much more readily
 than others. 8. Contagious diseases generally have a deter-
 mined time of invasion after an exposure to their cause:
 but the advocates for contagion in the yellow fever can-
 not be confined in this manner. “ Their doctrine re-
 “ quires that it (the contagion of yellow fever) be per-
 “ mitted to act at any time between that of the exposure
 “ and the sixteenth day; otherwise it would not em-
 “ brace cases enough to give it a currency.”‡ 9. “ Con-
 tagions

* Arguments of this kind involve us in an endless dispute similar to that relative to the *equivocal generation* of plants and animals; that is, the production of plants without a seed, and animals without parents. As some diseases are confessed to arise from some kind of seed, we are puzzled to account for the origin of the *first* disease of that kind. Nevertheless, as these diseases do exist, the difficulty arising from a consideration of their origin is overlooked. In the yellow fever, which is not of so long standing, the origin is more disputed. But it is likewise undeniable, that some contagious distempers (the itch particularly) though capable of being propagated by contagion, may yet arise from want of cleanliness, and living on particular kinds of food. May not this also be the case with the yellow fever? And is it not the safe and rational way to act as though it might not only be produced at home, but imported from abroad?

† This is the very point in question; but our author, instead of enumerating the facts by which his position may be supported, refers to Dr. Lind, whose evidence shall be afterwards considered.

‡ No greater latitude, or very little more, is required by the advocates for the contagious nature of the yellow fever than Dr. Seaman must allow in a distemper which he himself owns to be contagious. It is well known, on the eastern continent at least, that a gonorrhoea will come on at any time between the first and *fifteenth* day after the infection is received. Dr. Guthrie supposes the time intervening between the reception of pestilential contagion and the appearance of the symptoms to be four days; and Dr. Chisholm thinks that in the Boullam fever it is somewhat short of two days: but it is plain that much must depend on the quantity of contagion, and the predisposition of the body to receive it.

“tagions act more or less at all places and seasons, simply of themselves, without the aid of any particular circumstance of air or climate; but the supporters of the yellow fever being contagious are obliged, *by the force of the foregoing observations*, to acknowledge their *imaginary fondling* to be but a *half-formed monster*, and perfectly inactive without being assisted by the concurrence of a predisposing constitution of the air. (Rush on yellow fever.) This fever exists only in warm weather: hence its cause in this city (New York) was perfectly extinguished by the frosty nights in the 10th month. It is confined mostly to low situations in thick-settled places; otherwise our almshouse and the surrounding country would have sadly experienced its deleterious effects.”

This argument merits a particular consideration, as involving a question of very great importance, namely, concerning the constitution of the atmosphere, which we have had occasion formerly to speak of, and which is by some thought to be sufficient of itself to produce epidemics, without the intervention of any other cause. This constitution of the atmosphere is, it is true, something *unknown*; and, when people appeal to it, it is only in other words owning their ignorance; but the necessity of recurring to some cause imperceptible by our senses has in all ages been obvious. So much indeed has been said in this treatise on the causes of plague (which may apply also to yellow fever)* that more would be superfluous, even if our limits would admit of it. The dilemma (and it is equally insoluble let us say what we will) stands thus: If the yellow fever is produced by the effluvia of marshes, by putrid steams, or by any thing else, how comes it to pass that it has been so frequent in the United States since the year 1792 in comparison of what it was for 30 years before? Have the American cities all at once become sinks of filth and nastiness? Have the seasons been changed, or have the inhabitants given themselves up at once to swinish intemperance and gluttony,

* See p. 166, & seq.

gluttony, devouring, like savages, their meat half-rotten, half-roasted or half-boiled? From some declamatory publications indeed one might be apt to think that the authors certainly meant to bring such accusations against them. But it undoubtedly will be found an hard matter to prove that the general cleanliness of the country is inferior to what it was, or that the people are less virtuous than they were before. Besides, has not the vigilance of the magistrate, ever since 1793, been exerted to the utmost to procure a removal of those nuisances from which the disease might be supposed to arise? Yet their efforts have not availed; for it is confessed that the attack in 1798 was the most severe ever experienced. If cold could have exterminated the disease, certainly the three last winters have been abundantly sufficient to do so; yet it is certain that cases of the fever did appear in the end of December last, when the cold must certainly have been deemed sufficiently intense to put a stop to putrefaction of every kind. No wonder then that people, unable to see the causes of these things, should have recourse to something invisible, which they called the *constitution of the atmosphere*. On this subject Dr. Haygarth of Chester makes the following objections to the commonly received opinions concerning epidemic constitutions of the atmosphere:*

“ 1. Dr. Odier of Geneva, in a letter to Dr. Haygarth, writes thus: ‘I believe it would not be difficult to prove that the state of the atmosphere is in no respect the cause (of the regular epidemics of that city;) for the villages and towns which surround it do not experience the same epidemic all years as Geneva, although they are situated under the same heavens, and exposed to the same vicissitudes of atmosphere.’ 2. Sydenham conjectures that some effluvia, issuing from the bowels of the earth, produce epidemics. Were this true, it might advance one step towards a solution of the difficulty by discovering a local difference in the atmosphere. But it has never yet been pretended that any such vapour was perceived. Yet every part of
“ the

* Sketch of a Plan to exterminate Casual Small Pox.

“ the earth must be capable of furnishing it ; as no portion of the whole habitable globe has been discovered where the air could not propagate the small pox. . . .
“ 3. Hence we may safely conclude, that the slight variations of the same climate, and the same season, must be altogether insignificant and nugatory. What important difference of atmosphere can be supposed to exist for weeks or months together in two neighbouring villages, or in the adjacent streets of the same town ? This remark is plainly applicable to the propagation of the plague and other infectious distempers. Yet the latest and most respectable authors continue to be misled by this groundless hypothesis.”

Objections of this kind do not solve the difficulty. The excessive disparity of seasons with respect to the spreading of epidemic diseases, the long cessation of them at some times, and their sudden revival, as if with redoubled fury, at others, indicate the operation of some cause invisible to us ; but whether that cause resides in the earth or in the air, cannot easily be known. As contagious matter seems to operate by being received with the air into the lungs, it would seem rather probable that the ultimate cause of epidemics resides also in the air. Dr. Haygarth complains that the *vapour* arising from the earth, supposed to produce epidemics, should be invisible ; but the contagion of the small pox, or of any other infectious disorder, is equally so. It must, he says, be diffused all over the earth. The electric fluid is so ; it issues from the earth in every part of its surface, as is demonstrated by the common experiments of electric machines ; and there are the strongest reasons to believe that it issues at some times and in some places in much greater abundance than others. But enough has been said on this subject ; we must now consider matters a little more obvious.

Though it is not easily seen in what manner the proportion of the ingredients which compose the atmosphere can be changed, and we are unable to discover the operation of the more subtle fluid contained in it, yet we are certain that its constitution must be different in different

ferent parts of the world. Islands, from their being surrounded on all sides by the sea, must of consequence have an atmosphere considerably different from that of the internal parts of continents, where the air always passes over large tracts of land. Hence the continent of America, being situated between the two vast oceans called the *Atlantic* and *Pacific*, must possess a constitution of atmosphere considerably different from that of the Eastern. Of consequence, the diseases of Europe and Asia, when transplanted to America, or to the American islands, will probably, sooner or later, assume a type different from that which they had in their own country. Dr. Waterhouse has taken notice of this in his letter to Dr. Haygarth, and thinks that it may hold good even in the small pox. “ May not the small pox “ (says he) operate differently in the two countries? It “ has certainly had a different appearance, and required a “ somewhat different treatment, almost every time it has “ come among us. That the difference in the virulency “ of the small pox, observed at different periods, when “ epidemic here, may be attributed to a peculiar constitution of the atmosphere, no one seems to doubt; “ and why may not the difference, so reasonably to be “ expected between the atmosphere of your island and “ this continent, allow us to suppose that there is some “ difference in the facility of receiving the infection?” This is also an important consideration, and may throw some light on the cause, as well as the mode of prevention, of this disease.

Lastly, Dr. Seaman attempts to disprove the authenticity of some cases which have been brought as positive proofs of the disease having been received by infection. These belong not to us to consider; it being impossible, by reason of the invisible nature of contagion, to determine from a simple consideration of any patient's case whether it was infectious or not. Dr. Fordyce has laid down the proper rule for judging in such cases.* One only of the instances brought by Dr. Seaman therefore we shall mention, and that, not because it proves any thing,

* See p. 169.

thing, but on account of its singularity. " Daniel Phœnix, city-treasurer of New York, is supposed without doubt to have taken his complaints from contagion : the corporation, some time past, having issued into circulation, for the accommodation of the inhabitants, a great number of paper penny bills, it has been concluded that he must have received contagion through the medium of some bundles of these bills, which he opened, that had been nearly worn out, to be exchanged, and which he opened and examined to ascertain their amount some days after he had received them." The Doctor allows that he might have been infected by the bills, but ascribes it to putrid effluvia.*

Dr. Smith, in his letters to Dr. Buel, insists much on the vitiated state of the atmosphere, and is at some pains to describe the persons who were most subject to it. These, in 1795, were for the most part *foreigners* ; under which denomination the Doctor comprehends those who came from other states, from the West Indies, and from Europe, or who had not been many months or years settled in the city. The number of citizens who suffered he does not suppose to have exceeded one in seven ; but he remarks, that, both among foreigners and citizens, the severity of the disease fell chiefly on the poor. This mixture of different nations he accounts, and with great probability, one of the causes of the distemper.

* Dr. Seaman, having at last, as he thinks, completely overthrown his adversaries, and ranked himself with the *more considerate and reasonable* part of the community, likens those who differ from him to such as believe in the *power of imagination* to mark the child in the womb ; and which he is of opinion that the women of America would not disbelieve, though all the physicians on the continent were to unite in persuading them to the contrary. On this subject the writer of this treatise is happy at having it in his power to declare himself of the same opinion with the ladies, and to offer, in support of their opinion and his, the following fact. A pregnant woman, having been employed in dyeing some cotton yarn, and rinsed it, after it had got the colour, in cold water, threw it, while wet and cold, about her neck. It touched the skin on the back part of the neck, and part of her arm. The woman started, shivered, and instantly said that her child would be *marked*. It happened exactly according to her prediction. The back part of the neck, and corresponding part of the arm to that which the cotton touched, being covered with purple spots in the child, exactly similar to what might have been made by drops of the purple liquid in which the yarn was dyed falling upon the skin. Of this fact I am as certain as of my own existence ; having been present when the cotton was dyed, having heard the woman call out as above related, and seen the child after it was born, and particularly inspected the marks.

temper. In confirmation of it he quotes Dr. Blane, on the diseases of seamen, remarking, "that it sometimes happens that a ship, with a long-established crew, shall be very *healthy*; yet if strangers are introduced among them, who are also *healthy*, sickness will be mutually produced." The same observation is made by Dr. Rush, who, besides a general reference to the history of diseases, adds the following remarkable fact: "While the American army at Cambridge, in the year 1775, consisted only of New England-men, whose habits and manners were the same, there was scarcely any sickness among them. It was not till the troops of the eastern, southern and middle states met at New York and Ticonderoga, in the year 1776, that the typhus became universal, and spread with such peculiar mortality in the armies of the United States."

This confirms the observation made in the former part of this treatise, when speaking of the English embassy to China. It may likewise with probability be assigned as one reason why large manufactories are generally so unhealthy. In them there always is a collection of people from many different and distant parts; and what holds good on a large scale must also do so on a smaller one. But this does not disprove the doctrine of contagion, but rather confirms it; for, if the discordant effluvia rising from healthy bodies of different *constitutions* can generate a disease, much more may we suppose the effluvia from sick persons capable of continuing and propagating it.

Now, let us consider the account, imperfect as it is, which we have been able to collect concerning the appearance of the yellow fever on the Western Continent. We have seen (p. 377, n.) that, at the time the plague was in England, five of the Americans were transported to that country; two of whom, after staying some time in England, were sent back, with other strangers, to America. This first colony having failed, another was sent; the Indians went to war among themselves, and the yellow fever is supposed to have made its appearance. Here a suspicion naturally arises, that a slight pestilential

pestilential taint had been imported by some of these strangers, and that what would have been the *true plague* in Europe or Asia, by reason of the peculiar constitution of the atmosphere in the New World, there became the *yellow fever*. The same may be said of the original importation of it into Martinico. Sauvages expressly says it was the *plague* which was imported. Moseley and others deny that any such disease as the yellow fever exists in Siam; and indeed it seems at any rate to be a new disease. It seems *possible* that diseases may change their nature; and Dr. Ferriar has given a dissertation on the conversion of diseases. As therefore the true plague never made its appearance in America or the West Indies, it seems not unreasonable to suppose that these countries are incapable of receiving it, but that the pestilential poison, when transported to the Western Continent, may assume a different, and in many respects an opposite, nature; the two diseases being thus like the opposite poles of a magnet, scarce agreeing in any thing but the common work of destruction.

It is needless to spend time in attempting to investigate the cause of this disease appearing at different periods. That of 1793 has been the most remarkable and the most destructive; the disease having never since that time ceased its ravages. Previous to its appearance at Philadelphia that year, Dr. Rush observes, that, “during the latter part of July, and the beginning of August, a number of the distressed inhabitants of St. Domingo, who had escaped the destruction of fire and sword, arrived in the city. Soon after their arrival the influenza made its appearance, and spread rapidly among the citizens.” The yellow fever quickly followed; for on the 5th of August the Doctor mentions his being called to his first patient. To the same purpose we are informed by Dr. Clarke that “the fever made its appearance in Dominica about the 15th of June, 1793, a few days after the arrival of a great number of French emigrants. They were not sick, and the fever had not made its appearance in Martinique when they left it. From the 1st of July to the 1st of October it

“ was

“ was computed that eight hundred emigrants, including
 “ their servants and slaves, were cut off by this fever;
 “ and about two hundred English, including new com-
 “ ers, sailors, soldiers and negroes, all fell victims to it
 “ in the same space of time. Few new comers escaped
 “ an attack, and few recovered. It spared neither age
 “ nor sex among the Europeans and emigrants; and not
 “ only the people of colour from the other islands, but the
 “ new negroes who had been lately imported, were all
 “ attacked. Such as had been long on the island
 “ escaped.”*

These facts seem to point out one of the causes, and very probably a principal cause, of this dreadful distemper. They show very evidently that there is a connexion between war and diseases. It has formerly been attempted to point out a natural connexion between the horrid practices of men, on these occasions, and the production of disease. These investigations, however chimerical they may be reckoned, are yet supported by many facts, which undoubtedly prove that mankind cannot always maltreat and torment one another with impunity. The affair of the Black assizes, and Old Bailey session, in 1750, shows, that by confinement and bad usage the human body, without being apparently deprived even of health, may become poisonous to those around it, and produce dreadful diseases. In like manner the inhabitants of St. Domingo, having been put to the most dreadful distress, became properly fitted for spreading destruction wherever they went.† It is even probable that, in proportion to the degree of distress suffered by these people, the disease communicated by them will be malignant; nay, that new diseases may spring up, which cannot be treated with success by any method

* Medical Review, vol. iv.

† Dr. Moseley who has written at some length on the interruption given to military operations by diseases, gives an account of general Dalling's expedition in 1780, where the English troops, confined in the castle of St. Juan, in an unhealthy situation on the river Nicaragua, were cut off by diseases; but these were fluxes and intermittents. He doth not mention the yellow fever among them. He tells us indeed that the troops under general Garth brought the jail fever along with them, and that those who returned to Jamaica were harassed with obstinate intermittents, with diarrhoea, dysentery, or painful enlargements of the liver and spleen.

method yet known to physicians. With regard to the disease in question, it seems plainly to have from some cause or other received an additional malignity. Dr. Chisholm says that what he calls the Boullam fever was supposed in Grenada to have been the common yellow fever of the West Indies engrafted on the jail fever. Dr. Lind, Dr. Jackson, and even Dr. Chisholm himself, agree that the former is not infectious: but from what has been already said the evidence seems to prevail in favour of the opinion that the latter is so. Should we then allow that two kinds of this fever might exist at the same time, in one city, the difficulty would be at once removed. But this has been reckoned by many, particularly by Dr. Ruth, as totally inadmissible; and indeed it is a maxim consonant to general experience, that two epidemics cannot exist in one place at the same time, or that two diseases can scarcely exist at once in the human body. This however must be understood, principally at least, of acute diseases, or such as affect the whole system; for if any disease of a particular part shall take place, it does not seem impossible that a fever may be superadded to such local disease. The following considerations may perhaps throw some light on the subject:

It appears from the experiments of Dr. Adair Crawford, that, when animals are immersed in hot water, the blood drawn from a vein is of a florid red colour. In summer it is likewise observed to be of a more florid colour than in winter. If heat thus gives a more bright red to the blood, it undoubtedly also makes it more fluid, and in proportion to its fluidity it will likewise become acrimonious; though this acrimony is not necessarily connected with a florid colour, as the blood of the arteries is not more so than that in the veins. In the yellow fever, however, the blood sometimes, towards the end of the disease, becomes endowed with extreme acrimony. Dr. Smith, in one of his letters to Dr. Buel, observes, that "blood drawn in the fever of 1795 was remarkably *wanting* in floridity; especially what was "evacuated towards the close of the disease, whether by "art, or spontaneous effusion. In one instance it seemed

“endowed with a caustic quality, and affected a lancet
 “so as to leave a permanent discolouration and inequality
 “on its surface.” He observes also, nay, considers it as
demonstrated, that the yellow fever *is not* a disease of vas-
 cular debility, and he says that it is attended with an
 astonishing *fluidity*, or, as it is called, *dissolution* of the
 blood. Every one therefore who comes from a cold to
 a warm climate must in some degree or other have his
 blood liquefied, and in a certain proportion rendered
 more acrimonious than before. This acrimony may be
 undoubtedly augmented by certain causes, and by none
 more probably than immoderate drinking of spiritous
 liquors. Every one therefore who comes from a cold
 country to a warm one, especially where the air is also
 moist, may consider himself as already diseased, at least
 in comparison with what he was when at home. For
 the blood is now exposed to a greater degree of heat,
 and consequently is about to absorb, or rather may be
 considered as in the act of absorbing, more, and con-
 sequently of changing from a thicker to a thinner or
 more fluid state; the latter being the natural situation
 of the blood in warm countries. Dr. Rush, in his in-
 quiry into the proximate cause of fever, has accounted
 for the dissolved appearance of the blood in malignant
 fevers to a tendency in the blood vessels to paralytic affec-
 tion. He says that “it (the dissolution of the blood)
 “begins in the veins, in which muscular action is more
 “feeble than in the arteries. This has been proved by
 “Dr. Mitchill in his account of the yellow fever in Vir-
 “ginia in 1741. He found the blood to be dissolved
 “when drawn from the veins, which, when drawn from
 “the arteries of the same persons, exhibited no marks
 “of dissolution.” This, as the Doctor observes, “is a
 fact of great importance;” only we must remember,
 that, in every thing relative to the human body, when
 we find two phenomena constantly accompanying each
 other, it is extremely difficult for us to determine which is
 cause or effect. Instances of this often occur; and in the
 present case the dilemma is as great as any other. Though,
 from the testimony of Dr. Mitchill, we cannot doubt
 “that

that in yellow fever the dissolution begins in the veins; and though it is likewise extremely probable that this dissolution is attended with a paralytic tendency, we cannot know whether the dissolution is the cause of the paralytic tendency, or the paralytic tendency the cause of the dissolution. The point, however, is of no importance. We see that in warm climates the blood of a person newly arrived has a natural tendency to dissolution, and of course the veins to the paralytic affection just mentioned. The liver therefore, which is supplied with blood by a large vein branched out like an artery, and terminating in other veins to carry back the blood from the former,* must be much more affected than any other part of the body; and this indeed seems a very probable reason why all those who come to warm countries become much more inclined to bilious complaints, which denote an affection of the liver, than they were before. This hepatic affection may very probably be greatly augmented, in new comers, by various causes. One of these is hard labour under a greater heat than they have been accustomed to; a second, that in the West India islands they have not access to that plentiful supply of fermented liquor, abounding in fixed air, which they had at home. This, though not generally taken notice of, is far from being a matter of little consequence; for, though emigrants from Britain and Ireland have been for the most part accustomed to drink spiritous liquors, yet fermented malt liquors certainly constitute the principal part of their drink. The total want of these, and the substitution of ardent spirit and water, must certainly be detrimental, even though they keep within the bounds of moderation, and much more if they do not. Dr. Moseley relates, † from Dr. Irving, that, in a bad kind of intermittent which broke out among the troops in service on the Spanish main in 1780, “nothing was so grateful as *Lou-* “*don bottled porter*. Wine was neither so much desired “by the sick, nor so serviceable in corroborating and “keeping up the powers of the stomach; which, like
“the

* See p. 22.

† Treatise on Tropical Diseases, p. 172.

“ the rest of the body, was soon reduced, from the “ slightest indisposition, to the lowest state of debility.” A third cause is no doubt their frequently drinking too freely of spiritous liquors, perhaps not of the best quality ; and which, as they are neither conjoined with the fixed air nor with the mucilage which as it were inviscate and blunt their force in malt liquors, cannot fail of exerting their deleterious properties in a very remarkable manner.

From these and other causes there must necessarily arise a predisposition to hepatic diseases ; and this predisposition cannot be removed until the blood has assumed the state of fluidity proper to the climate in which they are, and the body has acquiesced in the change. They are then said to be *seasoned* to the climate ; and it is seldom that this seasoning takes place without a disease ; indeed so seldom, that the first illness which happens to seize them after their arrival is called the *seasoning*. Dr. Trotter indeed gives a very different account of this seasoning. He considers those who come from a cold to a warm climate as having a redundancy both of excitement and excitability, and says that “ to wear “ out this accumulated excitability by slow and gentle gradations is the grand explanation of the word *seasoning* : “ it is the *secret* which constitutes the only difference between the inhabitants of England and Jamaica. The “ yellow fever of the West Indies therefore, as it appears “ in the body of a raw European, is a disease of the “ utmost excitement, in a constitution of *accumulated excitability* ; where a tense fibre and dense blood permit it “ to be carried to the highest pitch of inflammatory “ tendency ; which, from the nature of the animal economy, speedily exhausts the powers of life, even in a “ day or two, inducing putrefaction and death.”

Explanations of this kind may edify those who understand them ; but, though we should declaim ever so much about excitement and excitability, it is plain, that, in every one who comes from a cold country to a warm one, the liver is affected in a manner that the rest of the body is not. In some constitutions, or from exciting

citing causes in any constitution, this affection of the liver may be augmented, and no doubt at last produce a bilious fever, which may be varied in a number of ways, according to the nature or the energy of these causes. The pure bilious fever, being of itself properly a local affection, may not be contagious; and we find it generally agreed among physicians that the common yellow fever of the West Indies is not infectious. Nevertheless, it seems by no means improbable that from certain circumstances contagion may be joined with it, and it may then spread and infect, even as the most deadly plague. Dr. Crawford relates, that, in the year 1770, a new kind of fever broke out in the Middlesex Indiaman, of which many died. It is not said that the disease was contagious; but, on opening the bodies of some who died, the liver was found enlarged, and of a more florid colour than it ought to be. It cannot be deemed impossible that contagion, even that of the true plague, might be mixed with this fever, which (as the affection of the liver was probably the original disease, might have been accounted little other than symptomatic) would then have assumed very malignant symptoms.

We might now say that we have got to the end of our subject. Having so amply discussed the question concerning contagion, and stated the principal part of the evidence against it, it seems proper to conclude the section with a short history of the disease in the malignant form it has assumed in the United States since the year 1792. Still, however, it is necessary to say something further of one or two of the causes which have been commonly assigned as necessarily inducing this disease. These are, 1. Extreme heat, and, 2. Marsh effluvia. The effect of the former has already been partly considered as a predisponent cause of yellow fever: but it doth not appear that merely from this cause the disease has ever been produced. It hath indeed been observed by very intelligent physicians, that in Virginia the remitting fever has often been brought on by mere exposure to the sun. Dr. Oliver of Salem hath obli-

gingly

gingly informed me, that he has "in more than one instance been seized with that disease after riding in the sun;" and that an eminent practitioner in Virginia had informed him that he had also more than once suffered in the same way. Drs. Taylor and Hansforth observe, that, when the remitting fever proves mortal, it is generally attended by sickness and perpetual vomiting; which is the termination of the yellow fever. The above evidence is decisive with regard to heat being able to produce a remittent, but cannot exactly apply to the yellow fever, which has no remissions. Two sailors indeed, lately brought from a coasting vessel to the Salem hospital, were attacked with violent symptoms of yellow fever without having been, as is said, exposed to any infection. But evidence of this kind cannot be supposed to be incontrovertible. We have already seen the difficulty of ascertaining *facts*; and if it is difficult to prove that contagion *has* been received, it must be still more so to prove that it *has not*. The persons in question had both worked during a very hot day in a vessel's hold, they afterwards sat exposed in the damp air of the evening on the deck until 10 o'clock at night, and then slept in the vessel's cabin with the windows open. One of them was seized in the night with a most violent pain, and the other on the morning succeeding. It is said that about 11 months since this vessel was at New York, and that a person on board had the yellow fever; it is also alleged that the vessel was not purified, and that the beds remained on board. It has therefore been by some conjectured that the disease might have been derived from this source.

Dr. Ramsay, in a letter to Dr. Currie of Philadelphia, censures Dr. Lining for saying that the yellow fever was imported into South Carolina. "The greater yellowness of the skin (says he) appears to be the only circumstance in which it differs from the bilious remittent fevers of hot climates, or very hot seasons of any climate." Our author also censures Dr. Lind of Haflar,* who, he says,

* If physicians censure one another at this rate, how is it to be determined who gives a true state of the matter?

says, has been misled by the *misrepresentations* of Dr. Warren and others. He also gives into the opinion that contagion acts only by contact, or at a very little distance; but this subject we cannot enter farther into at present. If we can believe Dr. Moseley, the sure criterion by which the yellow fever may be distinguished from any other is, that the former hath no remissions.* If solitary cases of it appear in Carolina and the southern States every year, this will not prove that the disease was generated in the country, any more than that the plague was generated in London, because it appeared there for many years successively.

But, if the heat of the sun cannot produce the true yellow fever, it can kill suddenly without any fever whatever. This is said by Dr. Moseley to be less frequent in the West India islands than on the eastern and western continents. He says that he has felt as great inconvenience from the sun's heat at Venice, Naples, Rome, Montpelier, and in Virginia, as in the West Indies;† but he concludes that the *transitions* from heat to cold are more pernicious to the human body than any continued heat, however violent.

With regard to the effluvia of marshes, it is not denied that they produce fevers, but those fevers are of the intermittent or remittent kind. Dr. Smith indeed, in the first volume of the Medical Repository, labours to prove that the plague described by Thucydides was not essentially

* This position of Dr. Moseley is not universally received. The meaning of the word *remission* certainly is a temporary abatement, and implies a recurrence, of the same symptoms which originally took place. Dr. Moseley describes the yellow fever as beginning with one kind of symptoms which suddenly cease and are succeeded after a certain interval by others of a quite different kind; and he claims the discovery as his own. If he be right in this description, the yellow fever is certainly not a remittent; if otherwise, it must be difficult to establish any true distinction between them.

† At Strasburg, in Germany, our author says that he saw a man who had been an idiot for more than a year from a stroke of the sun. The 8th of July 1707 was so hot in England that many people died at their work, and many horses and oxen were killed by the sun's rays. In 1743, eleven thousand people perished from the 14th to the 25th of July in the streets of Pekin in China. On the 30th of July, 1795, the heat at Montpelier was so great, that eggs were roasted by it. Chalmers, in his account of the weather and diseases of South Carolina, says, that he has seen a beef-steak, laid on a cannon for twenty minutes, deprived of its juices, and overdone by the excessive force of the sun's rays.

essentially different from the fevers which sometimes prevail in North America, and that it had its origin from marsh effluvia and the ravages of war. That this distemper was not the plague described by Ruffel we may gather from a single circumstance: for Ruffel tells us that *sneezing* never occurred in the plague described by him,* while Thucydides says that it was one of the common symptoms of his. Neither does the description of it (Appendix No. 1) at all agree with any of the accounts of the yellow fever we have. The climate of Attica no doubt was variable, and may in this respect resemble that of North America; but so is the climate of China, yet no such diseases are there produced. The Doctor concludes that the distemper originated from *local* causes; but the difficulty we find in proving such origin of diseases in our own days, and in the country where we reside, must certainly make us look upon the proofs which can be brought for the local origin of a disease which happened two thousand years ago, and in a distant country, as very equivocal. The following extract from the Paris Medical Memoirs may be adduced as a proof of the intrinsic power of marsh mud to produce fevers. It is contained in a paper written by Dr. Perkins of Boston.

“ A farmer was in the practice of spreading, upon about
 “ thirty acres of land, some new marsh mud, from Octo-
 “ ber to April annually, to increase the fertility of the
 “ soil. In the summer of the third year, those inhabi-
 “ tants who lived to the northward and eastward of the
 “ place were attacked with a very malignant fever, which
 “ generally proved mortal. What is a proof that the
 “ marsh mud was the cause of the disease is, its extent,
 “ which was not more than a mile and an half from the
 “ farmer’s house, in the direction of the southerly and
 “ westerly winds. Perhaps had this marsh mud been
 “ washed by plentiful rains, the danger would have
 “ been less. Something like it happened to the inhabi-
 “ tants of the marshes in *East Sudbury*, (les marais situes
 “ a l’est dans le Sudberg) where the passage for the wa-
 “ ters was too deep, and too confined. In regular sea-
 “ sons

* See the Table.

“ sons they were attacked with simple intermittent fevers ;
 “ but, after wet seasons, there prevailed among them ma-
 “ lignant fevers, and very obstinate remittents. Since
 “ the marshes have been drained, the inhabitants are no
 “ longer subject to fevers, and are as healthy as those of
 “ others places. We know that there are local epi-
 “ demics, which are produced by a low, wet and rich
 “ soil ; such are, probably, those which prevail in the
 “ lower part of New York, which, according to the in-
 “ formations obtained by Mr. Perkins, is more unheal-
 “ thy towards the end of the summer than the other part
 “ of the city, and whose inhabitants are subject to diseases
 “ of a putrid *caractere*.

“ It appears, from several observations, that the most
 “ mortal epidemic fevers are not commonly produced
 “ by causes operating immediately ; the cause often ex-
 “ isting several months before the disease even appears.”

The other arguments used by Dr. Smith in his letters to Dr. Buel proceed upon the state of the city, the mode of living, &c. and the condition of most of the emigrants, their bad accommodations, and especially their abuse of spiritous liquors. The neglect of bathing is also much complained of, and a comparison made with the conduct of the French in this and other respects, greatly to the advantage of the latter.

Drs. Taylor and Hansforth consider the disease which took place in Norfolk in Virginia as only an higher degree of the common remittent fever which usually prevails, and ascribe it to the long-continued heat, putrescence, &c. Some French ships were said to have brought the disease, but these arrived “ so long before the disease appeared, that (the Doctors think) it would be absurd to suppose even a possibility of its being derived from them.” Mr. Webster adds, in a note, that the French corvettes, three of which Squadron were taken by the Thetis, capt. Cochran, “ anchored in
 “ Hampton Roads, May 18th. The fever did not
 “ appear in Norfolk till August. captain Cochran’s
 “ crew, however, *took the fever from the French prisoners,*
 “ and twelve of them died before the Thetis reached

R r r

“ Halifax.”

“Halifax.” This is certainly a suspicious circumstance.

Dr. Ramsay, in his letter to Dr. Mitchill concerning the same distemper, observes that it was confined almost entirely to foreigners, of whom he gives a very unfavourable account. The situation of the town, putrescence, &c. are likewise brought in for a share, as well as the season, which had been uncommonly warm.

These are the principal evidences that have been brought for and against the origin of the disease which since 1792 has raged with such violence in the United States. Innumerable pieces have appeared in the Newspapers on both sides of the question, the most remarkable of which are the letters of Mr. Noah Webster to Dr. Currie. These, however, we cannot now consider, as we cannot expect indeed that they should contain any thing else than a fuller detail of what has already been set forth. Mr. Webster besides, in his letters, owns that he is not a medical man; nay, that he had not “read above three or four medical books.” I hope therefore the reader will excuse the preference given in this treatise to the writings and arguments of those who are acquainted with medicine both by reading and practice. The dispute between the College and Academy of medicine can be settled only by themselves; the only safe line of conduct seems to be to admit both doctrines, and to take every method of preventing the introduction of the disease, whether supposed to be generated or imported.

Whether the distemper which has so fatally prevailed since the year 1793 be naturally connected with the troubles in Europe and the West Indies or not, it is certain that it has been cotemporary with them. In New York the disease appeared in 1791, but we are not furnished with any particular accounts of it at that time; nor does it appear to have made any great ravages, either on the continent or the West India islands, till 1793. At this time the war raged in Europe with fury; the French royalists were every where driven out, and distressed in every possible way. Desolation and slaughter prevailed at St. Domingo, while an unbounded inter-

course

course took place between the United States and all those nations who were involved in the calamities resulting from the unbridled passions of man excited to their utmost pitch of ferocity. In the midst of this general commotion the fever broke out in the West India islands, appearing first in the island of Grenada. We have seen, that, according to Dr. Chisholm, this disease was brought to Grenada in the Hankey, from the coast of Africa, on the 18th of February. About the middle of April it began to appear on land. In the beginning of May it reached a detachment of the royal artillery lying at a distance from the focus of infection, "but" (says Dr. Chisholm) by the communication which the "gunners in Fort George had with the 45th regiment, "and the predisposition of the men to receive the infection as far as that could be induced by excesses in "drinking, and other irregularities." About the first of June the disease began to appear among the negroes of the estates in the neighbourhood of the town, but never attacked them with the same violence that it did the white people. During the months of May, June and July, it appeared in different parts of the country; being, as our author supposes, carried thither by infected persons. From Grenada, the Doctor says, the disease spread to the islands of Jamaica and St. Domingo, and from the latter to Philadelphia, "by vessels on which "the infection was retained by the clothes, more especially the woollen jackets, of the deceased sailors."

This account of the origin of the fever at Philadelphia, as we have already seen, is inadmissible by those who deny the contagious nature of the disease; but as the latter have never given any distinct account of its rise, or shown why it should first appear in one island and then in another, instead of beginning in them all at once, we must adhere to that of Dr. Chisholm, till we are furnished with a better.

In Philadelphia it has already been observed, that Dr. Rush was called to his first patient on the 5th of August; but Mr. Carey mentions a child of Dr. Hodges "as probably the first victim;" who was taken ill on the

26th or 27th of July. This same month the unfortunate fugitives had arrived from Cape Francois; and we have already seen, from Dr. Clarke, that the arrival of some of their fellow-sufferers in Dominica had the same dreadful attendant. Whether the disorder is to be ascribed to the arrival of these people in either place, the reader will judge. Other vessels are charged with having imported the same; but, facts being disputed, we cannot enter into the controversy.

The disease began in Water-street, to a particular part of which, near to that where the suspected ships lay, it was for some time confined, but did not excite public alarm till about the 19th of August. From this time to the 25th of the month the attention of the citizens was so much aroused, that they began to move into the country; and on the 22d, the city commissioners were peremptorily ordered by the mayor to keep the city clean. On the 26th the College met, and addressed the citizens on the subject; recommending such means of preventing the spreading of the sickness as to them seemed most proper. Among these were, to avoid any intercourse with the infected, to live temperate, keep their minds easy, and to avoid fatigue. Lighting of fires was particularly disapproved of; but the burning of gunpowder, and the steams of vinegar and camphor, were recommended for infected rooms, and for using on handkerchiefs, and in smelling-bottles.

In consequence of this address also the bells were stopped from tolling, the constant noise of which had greatly contributed to increase the public alarm. The people, who had been in use to light large fires in the corners of the streets, being forbid on the 29th by proclamation to do so, had recourse to firing of guns; which was at last carried to such excess, that it also was prohibited by proclamation on the 4th of September.

Notwithstanding all these precautions, the distemper continued to increase in such a manner as to produce the most dreadful terror and dismay. "Indeed (says Mr. Carey) it is not probable that London, at the last stage of the plague, exhibited stronger marks of terror than
" were

“ were to be seen in Philadelphia, from the 26th or 27th of August, till pretty late in September.” This produced scenes of distress unparalleled till this time in the city, and of which many instances are to be met with in Mr. Carey’s account. It cannot, however, be doubted that the violence of the distemper, its contagious nature, and the consequent danger of visiting the metropolis, were greatly exaggerated. Thus terror was struck throughout all the adjacent states. At Chester-town, in Maryland, a meeting was held, on the 10th of September, in consequence of which the Eastern shore line of stages was quickly stopped. On the 11th of the same month it was ordered by the mayor of New York that the names of all such persons as had arrived or should arrive from Philadelphia or other place, by land or water, that were or *should be sick*, should be reported to him, that those who were sick of infectious diseases might be removed out of the city. Next day the governor proclaimed that all vessels from Philadelphia should approach no nearer than Bedlow’s island, about two miles from the town, till license was given. But these precautions not being deemed sufficient, a night watch was established, and next day an address was published by delegates, purporting the insufficiency of all that had been done, and again calling upon their fellow-citizens to exert their utmost vigilance in detecting the fugitives from Philadelphia. Various other resolutions were passed in New York; and throughout the whole continent such measures were taken as seemed most likely to proscribe the unhappy Philadelphians, and to prevent their having any place of refuge from the sickness they so much dreaded. On the 1st of October, however, the inhabitants of Springfield, in New Jersey, passed a resolve, offering their town as an asylum for the people of Philadelphia, and directing an hospital to be provided for the reception of such as might fall sick. Similar resolutions were passed by the inhabitants of Elizabethtown, and Elkton in Maryland.

The distemper in the mean time arrived at the most dreadful height in Philadelphia, and almost all those
who

who could take the charge and burthen of public affairs were absent. An hospital had been established at Bush Hill, but, for want of superintendence, had fallen into such disorder, that the poor chose rather to deny their illness than to be sent to it. On the 15th of September, however, Stephen Girard, a native of France, and a wealthy merchant, together with Peter Helm, a native of Pennsylvania, offered their services as superintendants. By their exertions the credit of the hospital was soon retrieved, and such numbers demanded admittance, that it became necessary for each candidate to procure a certificate from a physician, that the patient really laboured under a malignant fever. In a short time the affairs of the city went on, in every respect, with as much regularity as could be expected; but the mortality increased throughout the month of September, and the three first weeks of October. Great hopes were entertained from some cold and rainy weather in the end September; but they proved illusive, and the disease became even more fatal than before, till the 26th of October, when it suddenly ceased, as Mr. Carey says, with hardly any rain, and a very moderate degree of cold. "That day (adds he) was as warm as many of the most fatal ones in the early part of the month. To account for this is perhaps above our power. In fact, the whole of the disorder, from its first appearance to its final close, has set human wisdom and calculation at defiance." During the time of this calamity Mr. Carey computes that *seven-teen* thousand left the city, and *four* thousand and thirty-one perished.

This city suffered another attack in 1794, but far less severe than before. In 1795 and 1796 the disease seems scarcely to have made its appearance; but in 1797 it revived, and, in 1798, broke out with greater fury than even in 1795. No particular history hath been published of this last severe attack. We know only in general, that, though a much greater number of the inhabitants fled out of town in 1798 than in 1793, the number of deaths was almost as great; being estimated at three thousand eight hundred and forty-one. Great disputes,

as has been observed, have taken place concerning the origin of these diseases ; on which we shall only further remark, that if, after such repeated and dreadful experience of the bad effects of allowing putrid matters to accumulate, such quantities could be collected as to produce the very fatal sickness of last year, it argues a most unaccountable, and indeed incredible, insensibility on the part of the people, as well as remissness on that of the magistrates ; and this perhaps may be accounted as strong an argument in favour of contagion as can be adduced.

That such a violent distemper should cease all at once, is indeed not to be expected ; and we have already heard of its again appearing in the city. Fear has been very justly excited, there and in other places ; but it is to be hoped that the remarkable coolness of the season will operate favourably in preventing any very violent attack for this year.

New York has also suffered very considerably from this disease. Here it appeared in 1791, in the autumn, and in a part of the town remarkable for its vicinity to a collection of filth. In 1792 it made no progress ; and in 1793, though some died of it who fled from Philadelphia, it did not spread. In 1794 it returned with considerable violence, and with still greater in 1795. In the history of this disease by Dr. Seaman,* he takes notice that in July and August an unusual number of persons suffered from drinking cold water, and some fell down and died in the streets ; but the Doctor supposes this to have happened rather through the excessive heat of the sun than the drinking of water. As the disease came on, all others gave way to it, even “ *the common remitting bilious fever* ;”† and in the month of July some cases occurred. We have already had occasion to take notice of the death of Dr. Treat, who was taken ill on the 22d of July ; but before that time, on the 6th of the same month, Dr. Seaman says that, in conjunction with this gentleman, he had visited a patient “ affected with
“ all the full-marked and decided symptoms of an highly
“ malignant

* Med. Repos. vol. i, p. 316.

† Webster's Collection.

“malignant yellow fever.”* The disease continued to gain ground in August, and became extremely violent in that and the following month ; but, according to our author, the low ground in the southeast part of the city was the “grand centre of the calamity, diffusing its effects like diverging rays, aiding, by its most powerful influence, different secondary centres, already smoking hot, to flame out its pestiferous operations.” In this part of the town five hundred died in three months.

The attack at this time did not arouse the people to a proper sense of their danger. As formerly, the origin of the disease in 1795 had been attributed to the filth of the city. Next year it was attributed to the same, and so in 1797 and 1798. This last year, particularly, it is said to have originated partly from great quantities of putrid beef and fish, collected for exportation, and which could not be exported. In Mr. Hardy’s account of this fever, it is calculated that there died in 1798 two thousand and eighty-six ; but that, if it were taken into the account how many left the town and died in the country, the number would amount to between two thousand four hundred, and two thousand five hundred.

It is not in Philadelphia and New York alone that this distemper has prevailed. Boston, Newburyport, Portsmouth, Portland, and even detached spots in the country, to which it is not possible to trace any infection, have felt its ravages. At Salem also, where the disease was never known before, twenty-one cases, including some doubtful ones, appeared in 1798 ; and of these, eleven proved fatal. In 1796, when it prevailed in Newburyport, it was supposed to have been introduced by a vessel from the West Indies ; and, according to Dr. Coffin, the opinion would have been incontrovertible, had not a large quantity of fish-garbage been collected at the place where the vessel landed ; so that, though the disease spread from that place, it could not be known whether it proceeded from the

* This proves that Dr. Treat *was not* the first person who suffered by this disease, but it will not prove that the disease was not imported by capt. Bird’s vessel ; for the fever spread in the vicinity of the vessel, not of the almshouse, where the first patient was carried.

the vessel, or the fish, or both. It seems now unfortunately to be the case, that where this disease once gets footing it cannot easily be eradicated. If we suppose it always to be imported, the continual intercourse with the West India islands will account for this; but the extreme difficulty, or rather impossibility, of procuring an account of facts or even a single fact which cannot be controverted, renders every thing that can be said upon the subject uncertain and precarious. In the case of New London particularly, where 81 persons were destroyed by it last year, neither importation nor collections of filth could be assigned as the cause; nevertheless it began near a *wharf*; but Mr. Holt, in his account of the disease, thinks it was most probably owing to the mere heat and dryness of the season. On the other side of the question, however, we must still insert Dr. Brackett's account of the origin of the disease at Portsmouth, in answer to a letter from Dr. Oliver of this place.

“ The yellow or pestilential fever made its first appearance at Portsmouth, about the first of August last. Eight or ten days before that time a vessel arrived here from Martinico, and brought a French family (four or five in number.) This vessel, before she left the West Indies, had two sailors taken sick (as the captain informed me) one of whom died on the passage home; the other was on the recovery when the vessel came into this port.

“ There was not, nor had not been for a long time before, any fever in this town. Two or three days after, I heard that one or two men, who were labourers (and probably had been on board, as they lived night where the vessel lay at the wharf) died suddenly with fever, but am uncertain whether with yellow fever, as I never saw them. The first of August, the owner, whose house was about four or five rods distant from the vessel, had a child of four or five years of age taken sick; the next day I visited it, and two days after he died. The symptoms appeared like a cholera morbus—sick stomach, and frequent puking of black

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“ bile.

“bile. The day before he died a brother of his, fifteen
“years old, was taken ill, and had much the same symp-
“toms, only greater inflammation and distress. He was
“blooded freely, took calomel, bark, &c. He died
“five days after he sickened. Between the 8th and the
“20th of August, four or five of the other children and
“servants were taken with the same symptoms, and re-
“covered. On the sixteenth day, a daughter, seventeen
“years of age, was taken down with the same disease :
“she was treated in the same manner, with bleeding,
“mercury, warm bath, bark, &c. and died on the 9th
“day. This patient had a great discharge of blood
“from her mouth and gums for three days before she
“died. One or two more of the family had it after-
“wards, and recovered. All these patients took the in-
“fection, I believe, about the same time. Many others
“in that neighbourhood had the fever during this
“time, about one half of whom died : out of forty-six
“patients I lost fifteen. If I could procure a foreness of
“the fauces, by administering calomel in small doses,
“and rubbing it in the gums, or by frictions on the legs
“and arms with mercurial ointment, the third or fourth
“day, I was sure of their recovery.

“How many died of this disease in the whole, I have
“forgotten ; as, through fatigue, and debility of body
“and mind, I kept no notes : I think rather more than
“half of those who had it. The fever agreed in every
“symptom, almost, with that described by Dr. Rush and
“others. The contagion did not appear to be propa-
“gated, as the largest number who had the disease were
“seized in the month of August, and lived in the streets
“only which communicated with the wharf where the
“vessel lay, and the beach where she was graved. These
“streets are in the highest part of the town, and always
“esteemed the most healthy, and as free of putrid sub-
“stances as any in it. In the months of September and
“October the fever was followed by dysentery, and
“spread through almost every part of the town and its
“environs. There has been no case of fever or dysen-
“tery since last fall : this place, during the winter, and
“summer

“ summer thus far, has been uncommonly healthy ; and
“ it appears likely to continue so, if the committee of
“ health should not be remiss in their duty. Thus,
“ without any comments, I have endeavoured to give
“ you a short history of the pestilential fever, as it ap-
“ peared here last summer. The ideas, you may com-
“ municate to the author of the book intended to be
“ published.”

The following letter from Dr. Warren, which he obligingly sent to two physicians in Salem, gives an accurate account of the distemper which prevailed in Boston last year :

“ I should immediately have answered your favour of
“ last month, but for a wish to give you as complete an
“ account of the causes and mortality of the late epi-
“ demic as could be collected.

“ There were a number of suspected causes, which,
“ though concealed during the prevalence of the disease,
“ it was hoped would be developed after the agitation of
“ the public mind had entirely subsided ; and I was in ex-
“ pectation that some regular returns would have been
“ made of the numbers who had passed through the dis-
“ ease, and of those who had died with it, so that some
“ estimate might be formed of its malignity and morta-
“ lity ; but such returns have not yet been made, and it
“ is therefore impossible to obtain any satisfactory evi-
“ dence on those heads. I suppose the number of
“ deaths to have been rather short of two hundred ;
“ but this is only a rude guess, and should not be
“ relied on in forming any consequential deductions
“ on the subject. I shall, however, now offer such an
“ account of the disorder as my present materials have
“ enabled me to prepare.

“ The first unequivocal appearance of the malignant
“ fever, in the town of Boston, was on the 20th of July
“ 1798 (though one family had been attacked with a
“ fever, attended with unusual symptoms, as early as the
“ middle of June ; but, as no other instances occurred
“ for so long a time, of an alarming nature, some doubts
“ may perhaps be justly entertained of the identity of the
“ affection.)

“ affection.) Three or four cases only, I believe, hap-
“ pened between this and the latter end of the month.
“ The two first of these were young men employed in
“ stores directly opposite to each other, on Green’s
“ wharf, near the Town-dock. A few days after, three
“ or four persons were seized with the same complaint,
“ whilst following their respective occupation in Mar-
“ ket square, on the east and south sides of Faneuil Hall,
“ or the Market-house. In the beginning of the
“ month of August several persons were taken sick in
“ the same neighbourhood, chiefly young men between
“ 16 and 24 years of age, whilst employed in stores and
“ counting houses there situated. The stores in Mer-
“ chant’s row, extending from the Market to State-
“ street, were more especially visited with the disease,
“ and, in the course of the same month, a family at the
“ bottom of State-street, and several persons at Oliver’s
“ dock, were taken sick. At this place a kind of basin
“ is formed between a point of the town projecting from
“ Fort hill, and the Long wharf, which is constantly re-
“ ceiving the offals of fish, and other animal substances,
“ which from its situation could not be washed off by
“ the waters contained in it. This spot is remarkable
“ for having been the residence of most of the persons
“ first attacked with the bilious remittent fever of 1796.
“ To the latter end of this month the number of sick
“ continued to be increasing; but the attacks were prin-
“ cipally confined to the above-mentioned quarters, till
“ at length the disease appeared on the south side of
“ Fort hill, at some distance to the southward of Oli-
“ ver’s dock, leaping, as it were, over the summit of the
“ hill, without lighting upon the inhabitants on the
“ north of that eminence. The fatality of the disease
“ was here probably greater than in any part of the town
“ of equal population; and it was nearly the last place
“ in which it disappeared. Very few families who re-
“ mained in their own houses upon the hill escaped its
“ attack; and the progress of the disease, in all the pla-
“ ces above mentioned, seemed to have been arrested
“ only by means of the evacuation of the buildings by
“ the

“ the people who inhabited them. In the latter end of
“ August, and through the month of September, many
“ persons were taken sick in Fore-street, which runs
“ northerly from Market or Dock square, along the
“ heads of the wharves, on the eastern side of the town.

“ Through the whole period of the sickness scarcely a
“ person was taken ill who had not resided, or been in
“ daily employment, in the vicinity of these places. The
“ subjects of the disease were generally natives of the town,
“ chiefly in the prime of life, and in the vigour of health.
“ I recollect no instance of any French inhabitants be-
“ ing assailed by it, and have heard of only one or two
“ instances of the blacks being affected with it.

“ That the fever was in a degree contagious, I cannot
“ entertain a doubt; but that it was not so in a very
“ high degree, I am as fully persuaded, from the number
“ of cases in which there was reason to believe it could
“ not have been taken in that way. In most in-
“ stances, where contagion might have been suspected,
“ the subjects were so situated that they might have re-
“ ceived it from the same source as those with whom they
“ had communicated. I cannot learn that any evidence
“ has been furnished of infection from the sick who had
“ been removed into the country, though there were
“ many instances of such removals, under the most ma-
“ lignant forms which it assumed.

“ The fever was generally ushered in by a chill, but I
“ think by no means equal to that which commonly
“ precedes fevers of the ardent kind, nor in proportion
“ to the violence of its subsequent periods. In a short
“ time the rigors were succeeded by excessive heat; the
“ pulse, which had been small and contracted, became
“ hard and full; the respiration laborious from violent
“ oppression at the scrobiculus cordis; the tongue as-
“ sumed a whitish cast; the eyes became highly infla-
“ med, while the pains in the head, back, and legs, were
“ intolerably severe. To these symptoms succeeded
“ nausea, and vomiting sometimes of a highly bilious
“ matter, seldom attended with diarrhoea, but often
“ with a burning at the stomach, tenderness of the ab-
“ domen,

“ domes, parcidity of urine ; and, in one instance, a dys-
“ furia, with a great proportion of blood at each evacu-
“ ation of that fluid.

“ These appearances usually continued about 43
“ hours, after which they often suddenly gave place to a
“ very different train of symptoms. The pulse sunk
“ astonishingly, and became intermittent ; the heat and
“ pains entirely subsided ; and the patient supposed
“ himself to be out of danger. From a perfect possession
“ of all his intellectual faculties, with a serenity of mind,
“ which in no other disease, I believe, is so generally ob-
“ served to accompany its last stages, on or about the 5th
“ day from the accession of the fever, he fell into a state
“ of insensibility, and thence sunk gently into the arms
“ of death. In others this change was less rapid ; the
“ pulse became gradually smaller, the distressing symp-
“ toms slowly abated, a coldness of the extremities took
“ place, and continued for several days before death, ac-
“ companied with clammy sweats, often without any
“ perceptible pulse in the wrists, for several hours before
“ the fatal termination. The tongue seldom became
“ much coated, to the last. Delirium was by no means
“ generally attendant ; and a yellowness of the skin was
“ far from being universal ; sometimes, however, this
“ appearance was observed within the three first days ;
“ often on the fourth and fifth ; and I was induced to
“ consider it as an accident, rather than a constituent
“ character of the disease.

“ The black vomit, as it has been usually called,
“ though in my opinion by no means to be considered as
“ a pathognomic sign of the disease (as I have frequently
“ seen it take place in other acute fevers, especially the
“ puerperal) was very frequently attendant on the last sta-
“ ges of the disorder ; very few recovered after this cir-
“ cumstance had taken place ; in one person, however, who
“ had it in the most alarming form, together with an in-
“ termittent pulse, coldness of the extremities, singultus,
“ and every usual mark of immediate dissolution, a most
“ unexpected recovery happily disappointed the positive
“ prognostics of his physicians. As the cure advanced, the

“ skin

“ skin in this instance became extremely yellow, and continued so for many weeks after the fever had subsided ;
“ the biliary ducts having been completely obstructed, and
“ consequently the alvine evacuations of a clayey colour,
“ and with much difficulty procured. Frequent repetitions of rhubarb and calomel in large doses, the continuance of the mercurial medicine in small doses, so as
“ to keep up a continual ptyalism, and a laxative diet,
“ restored him to perfect health.

“ For the discoveries which were made on dissecting
“ the bodies of some of those who died with the disease,
“ I beg leave to refer you to a publication in the Boston
“ Centinel, made during the prevalence of the disorder
“ in this place, and subscribed by Dr. Isaac Rand, sen.
“ President of the M. Medical Society, and myself.”
(For these discoveries see the table, facing p. 434.

“ We had heretofore treated our patients agreeably
“ to the method practised at Philadelphia in 1793, with
“ bleeding in most instances, and active purges of jalap
“ and calomel, or Rochelle salts. The diseased state of
“ the liver, the known effects of mercury in hepatitis,
“ and the recollection of the suggestions contained in
“ Dr. Rush’s publication on the yellow fever, together
“ with those of several other celebrated writers on the
“ same subject, induced us to enter immediately on the
“ use of calomel in small doses, as recommended in our
“ paper above referred to.

“ In my own practice I *now* usually commenced the
“ treatment by bleeding from ten to sixteen ounces, and
“ followed it by a dose of between ten and fifteen grains
“ of calomel with between twenty and twenty-five
“ grains of jalap, or an ounce of Rochelle salts, or more,
“ according to the constitution. Immediately after the
“ operation of these medicines I began with the use of
“ calomel in small doses, in pills of a grain, every hour,
“ and sometimes of 3 grains every two hours. Within
“ the first twenty-four hours, but scarcely ever after, I
“ found occasion frequently to repeat the bleeding, and
“ it is worthy of remark, that in scarcely a single instance
“ was this operation performed without almost instantane-
“ neous

neous relief ; although in most cases, a few hours after, there was a recurrence of the symptoms. The blood for the most part was dark. In three cases there was no separation of serum from the coagulated mass at the end of forty-eight hours. In two of these (and they were the only cases in which I observed it) a firm buff was formed on its surface ; and all three died of the disease.

The calomel was often continued through the whole course of the fever ; and ptyalism was usually brought on within three or four days : though sometimes upwards of 200 grains were given, at the rate of a grain every hour, without any specific effect on the salivary glands. In proportion as the soreness of the mouth advanced, the symptoms universally gave way ; and in every patient, two only excepted, this effect of the remedy was a sure pledge of recovery. In this exception were comprehended two persons of the same family, a father and daughter, both of whom had survived the 14th day of the disease, had copious hæmorrhages from the mouth (a circumstance which also attended on many who recovered) and died in a state of apparent putrefaction.

The purgative medicines were generally repeated every second day ; or an enema of water gruel was administered occasionally, if the bowels were constipated ; but if otherwise, and the calomel passed off by those emunctories, opium was combined with it in sufficient quantities to restrain the discharge. The evacuations which took place from the intestines, during the use of the mercury, were almost universally of a remarkably dark colour, generally approaching to a deep green, but by no means remarkably foetid. When spontaneous, they were often observed to be of the colour and consistence of water gruel.

In cases of very laborious respiration, which was frequently in an extreme degree distressing, especially after the first 36 or 48 hours had elapsed, blisters, applied either to the chest or extremities, had a favourable effect ; on the latter, they were most useful in the
“ advanced

“ advanced stages of the disease, by exciting to action
“ the debilitated vessels, and by restoring circulation and
“ warmth to the parts. In the same intention, wine,
“ snake-root, and the bark, were sometimes used with
“ advantage.

“ The diet was generally of the lightest and most cool-
“ ing nature ; barley-water, apple-water, and spruce-
“ beer, were generally both grateful and salutary. The
“ warm bath was often exhibited with apparent success,
“ especially in the beginning of the disease, and when a
“ copious sweat had been induced by it. The cold bath
“ was also resorted to by some respectable practitioners,
“ and perhaps, under some circumstances, with good ef-
“ fects ; but I have no reason to think it was generally
“ advantageous.

“ Upon the whole, I believe that the most efficacious
“ remedy, and the only one to be relied on, is mercury.
“ It is certain that, as far as my observation has extend-
“ ed, under no other method of treatment did so many
“ recover ; and there were but few instances of a fatal
“ termination, when it had been administered from the
“ commencement of the fever.

“ Various have been the causes assigned to this disease.
“ That its origin was domestic, I have not a single doubt.
“ No instance of the arrival of any vessel from the warm-
“ er latitudes, with this sickness on board, has been dis-
“ covered ; and it is believed that the local causes are
“ sufficiently numerous to account for its existence. At
“ most of the places, where its ravages have been made,
“ very large quantities of putrid substances had been for
“ some time accumulating. The offals from the fish
“ market, as well as damaged fresh and salted fish to an
“ immense amount, had been thrown into the dock. A
“ very great number of raw hides had been imported,
“ and stored in places contiguous to those in which busi-
“ ness was constantly going on. The influence of a
“ continued heat through the summer, to a degree scarce-
“ ly before known in this country, had rendered these
“ articles highly putrid ; and from the same cause se-
“ veral articles of provision, such as barrelled beef, &c.

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“ which

“ which had been prepared for exportation, but, by rea-
 “ son of the restraints laid on our commerce, retained in
 “ store, had become tainted. The effects of these were
 “ in some instances incontestibly evinced ; three lads,
 “ who had been employed in repacking beef, were at
 “ about the same time seized with the disease in its most
 “ fatal form ; and a person, who had purchased some of
 “ the hides at a low price, immediately after their remo-
 “ val fell a sacrifice to his folly.

“ Two or three thousand of the inhabitants removed
 “ into the country, and began to return about the mid-
 “ dle of October, when the decline of the disease justi-
 “ fied the measure.”*

SECTION

* The following facts, in confirmation of the importation of the yellow fever, were communicated in a letter from an eminent practitioner in New Haven to a gentleman of the same profession in this town. They came to hand too late to be inserted otherwise than in a note, the sheet being already prepared for press :

A child was reported to have died of worms, and the parents were indulged in the common ceremonies of burial : but the truth was, that the disease had been the black vomit. The consequence was, a very extensive spread of the contagion. In less than a week six out of eight of the bearers were taken with the fever, and these were young persons from different parts of the town. “ As to the suppositions (says the gentleman) with respect to local causes originating the disease, I conceive there is no occasion to seek for any other than what was contained in the chest (p. 444) which was a blanket and clothing taken off the corpse of one who had died of the fever in the West Indies, and without the least formality of cleansing put down into a close chest, and brought to New Haven, and lodged in Austin’s store. Now it appears to me (these facts well ascertained) as idle to inquire after other causes, as it would, suppose it were the infection of the small pox brought in a chest, and a number of persons who had inspected the chest to be taken down with it. Would, in such a case, mankind have racked their inventions to have investigated other inducing causes ? Surely not. . . . As to local putrefying substances, there was nothing but what has been common to the place, where the fever made its first appearance, for many years in dry summers.

“ I might revert to the introduction of the fever by importation at Chatham on Connecticut river ; at Providence, Rhode Island ; in which the importation was as evident as at New Haven. In short, there is scarcely a place on the continent, where this fever has made its appearance, but what it may be traced to an imported origin. There have been but two or three exceptions which I have heard of.”

The following particulars relative to the disease at Portsmouth may likewise be deemed authentic, as communicated by a respectable gentleman (though not of the medical profession) in that place : “ Most men of judgment and information on the subject suppose it was imported last year in a ship of Mr. Sheafe, which arrived from Martiaico about the 20th of July. One man had died on board this ship in the West Indies : all the rest arrived in health ; but the disorder made its appearance in a few days afterwards. Mr. Sheafe lost three of his his own family. He lived within a Rone’s throw of the wharf where his ship lay, and the fever spread in the neighbourhood.

SECTION III.

Methods of Prevention and Cure.

IN the yellow fever, as in the plague, where an attack is frequently made with such violence as to bring on death in twenty-four hours, or even a still shorter time, it is plain that much more dependence must be placed on prevention

“bourhood. Mr. Plummer, in the next house to Mr. Sheafe’s, died about the
 “10th of August; Miss Parker, in the same house, four days afterwards; and
 “Miss Smith, who had lived nearly opposite, removed to Berwick, and was
 “there seized and died about the same time. It is worthy of remark, that
 “this was always thought the most healthy part of the town.”

As a contrast to these evidences, we subjoin the following epitome of part of Dr. Rush’s address to the citizens of Philadelphia on the origin of the yellow fever, &c.* In this address, the Doctor considers it as indisputable that the disease is, in all countries, the offspring of putrid vegetable and animal exhalations; but it prevails only in hot climates and in hot seasons. In Philadelphia it arises, 1. From the docks; and hence, in New York, it has got the name of the *dock fever*. 2. From the foul air of ships. 3. From the common sewers. 4. From the gutters. 5. From dirty cellars and yards. 6. Privies. 7. Putrefying masses of matter lying in the neighbouring part of the city. 8. Impure pump water.

The disease is considered by the Doctor as an higher degree of bilious fever. He answers the objection by Dr. Chisholm (see p. 467) where he speaks of the fever not being produced in 1778, “when it was less in a more filthy state by the British army than it has been at any time since.” To this he answers that for the production of the disease three things are necessary. 1. Putrid exhalations. 2. An inflammatory constitution of the atmosphere, and, 3. An exciting cause, such as great heat, cold, fatigue, or intemperance. The constitution of the atmosphere, however, he looks upon to be the principal cause; as without this constitution mild diseases would be produced, but along with it they become very malignant. “The pestilential constitution of the air
 “in the United States began in 1791. It prevailed in Charleston in 1792,
 “and it has been epidemic in one or more of the cities or country towns of the
 “United States every year since . . . It has not been confined to the sea-
 “ports. It has prevailed since the year 1793 in many of the villages of New
 “England, and of the southern states. On the Genesee river it has become
 “so prevalent as to acquire the name of the Genesee fever. The bilious fevers
 “which prevailed in all the above places before the year 1793 were of a mild
 “nature, and seldom mortal. They have lately disappeared, or are much di-
 “minished; and have been succeeded by a fever which frequently terminates
 “in death in five days, with a yellow skin and black vomiting.” These
 circumstances are supported by undeniable testimony.

In answer to the question, “Can the yellow fever be imported?” Our author answers as follows: “I once thought it might; but the foregoing facts au-
 “thorise me to assert, that it cannot, so as to become epidemic in any city or
 “country. There are but two authorities on which the belief of this disease
 “being imported rests. These are Dr. Lining’s and Dr. Lind’s. The for-
 “mer says it was imported into Charleston in 1732, 1739, 1745 and 1748. The
 “latter says it was conveyed into Philadelphia, where it afterwards became
 “epidemic, by means of the clothes of a young man who died in Barbadoes.
 “No circumstances of ships or names are mentioned with these assertions to
 “entitle them to credit, and from the facility with which vague reports of

* Printed in 1799.

prevention than the efforts of the most skilful physician after the disease has once begun ; for, in such violent attacks, medicines, though ever so powerful, have not time to act. In countries therefore where this terrible disease exists, the first consideration necessary for every individual is, whether he is one of those likely to be attacked by it. Now, from the general testimony of those who have seen this fever, it appears that such as are newly arrived, the young, and in other respects the healthy and strong, the laborious, and the intemperate, are most liable to be attacked. Dr. Naffy of Philadelphia seems *alone* to afford an exception to the general testimony. Speaking of the cause of epidemics, after having ascribed them to some constitution of the atmosphere, he says, “ If the air is “ not infected, diseases cannot be epidemic ; and this is “ so, *indeed*, though it only attacks the natives. What “ can be the cause of that corruption of the air ? For “ what reason are the natives, and those inured to the “ climate of Philadelphia, *alone* infected with the prevail- “ ing disease, while *foreigners* escape it ?” Dr. Chisholm particularly points out those who, in 1793, were most liable to the Boullam fever. These were, “ 1. Sail- “ lers ; more especially the robust and young ; those “ least accustomed to the climate ; and those most given “ to

“ the foreign origin of this disease have been admitted and propagated by phy- “ sicians in other countries, there is reason to believe the assertions of those “ two physicians are altogether without foundation. The College of Physi- “ cians of Philadelphia, after two weeks investigation, were unable to discover “ any ships, clothes, or sick person, that could have introduced the disease in- “ to Philadelphia in the year 1793. The Academy of Medicine have clearly “ proved, by many documents, that the disease was not imported in the years “ 1797 and 1798. The origin of a few cases, reported by Dr. Griffiths and “ other members of the College of Physicians, which have lately appeared in “ our city, has in vain been sought for from a prize sloop of the Ganges. Two “ affidavits of Messieurs Hill and Ingersol prove that she had been healthy in “ the West Indies, and that no person had been sick on board of her during “ her voyage, nor after her arrival in our port. Equally unsuccessful have “ been the attempts to derive those cases from beds and blankets infected by “ the fever of last year. In Boston, Connecticut, New York, Baltimore, Nor- “ folk and Charleston, both physicians and citizens have long ago rejected the “ opinion of the importation of the fever. Some physicians suppose it possible “ for the contagion of this fever to adhere to the timbers of ships that have “ sailed from West India ports, and that it may be propagated from them to a “ whole neighbourhood, although houses, and even streets, interpose between “ them. This opinion is too absurd to stand in need of refutation. Indeed “ every thing that relates to the importation of this fever is contrary to reason “ and facts—it is an error, substituted in the room of a belief that all pestilen- “ tial diseases were derived from the planets.”

“to drink new rum. 2. Soldiers; more especially recruits from Europe; and the most intemperate. 3. White males in general lately arrived; more especially young men from Europe. 4. All other white males; more especially the lower classes; and of them the most intemperate; those debilitated by recent sickness. 5. White, females, more especially those connected with the shipping; and those lately from Europe. 6. People of colour, from *Mustees* to *Cabres*. 7. Negro men; more especially sailors and porters. 8. Negro women; more especially house wenches. 9. Children; more especially those of colour.” It is certain, however, that, when the distemper rages with great violence, natives as well as foreigners are liable to be attacked. We cannot suppose that all who perished at Philadelphia in 1793 and 1798 were foreigners. Though the latter therefore have the greatest occasion to fear, the natives must not think themselves absolutely secure; neither are foreigners to be terrified in such a manner as if they could not escape. With respect to the general modes of prevention, then, to which it is the business of every individual to attend, the following things are to be taken into consideration:

1. Every one who comes from a cold to a warm climate may be assured that on his arrival the temperature of his body is higher by three or four degrees than that of the native inhabitants.

2. In this situation he must consider himself as necessarily about to undergo a change of constitution; and such change he may likewise be assured will best be made by the gradual operations of nature; concerning which we know so little, that it does not seem adviseable to use any artificial method of promoting or accelerating it.

3. As the voyage from the Eastern continent must have taken up a considerable time, and as the mode of living on sea must have been very different from that to which he was formerly accustomed, we must consider the constitution as already in some degree altered from what it was when the person first went on board.

4. This

4. This alteration will be greater or less according to circumstances. If the vessel has been much crowded with passengers; if the weather has been stormy, so that he has been exposed to damp; if they have had little water, or of bad quality; if their provisions have been bad, or if there has not been a sufficient supply of fresh air in the place where he slept; the body must be considered as already predisposed to disease, which the new climate will scarcely fail of bringing to maturity.

5. Every one must consider that mode of living to which he has been accustomed the greatest part of his life as *natural* to him. Any considerable deviation from it, especially if sudden, would be of bad consequence, even in his own country; much more must it be so in another. As much as possible therefore he ought to conform his mode of life in the new country to what it was in the old, adhering only to the rules of temperance.

6. It has already been observed, that we must take into account the time that the person has been at sea, and the difference between his mode of life during his voyage, and that to which he was formerly accustomed. This difference consists in one particular in having lived for some weeks entirely upon salt provisions. To these he has been in some measure accustomed; and therefore it must be reckoned injudicious to give up the use of salted meat at once for such as is fresh. In fact, this mode of abandoning salt meat for fresh has been reckoned by the best physicians one of the causes by which the disease is brought on. Drs. Taylor and Hansforth express themselves in the following manner on this subject: "It has been noticed by several medical writers, that fresh meats, and particularly beef, in southern climates, apparently generate fluxes and other malignant diseases." Dr. Ramsay, also, says of those who were mostly affected with the yellow fever in Norfolk, that, "being *foreigners*, they dealt lavishly in beef, fish, and all kinds of fresh food. Observe, this beef was driven perhaps from one to two hundred miles before killed, then exposed in a hot market to vend; that, by one o'clock, their dining hour, I always did, and do, believe it must have been

“ been tainted. Observe, the fish were all dead by break
 “ of day, and brought by land from twenty to twelve
 “ miles—hard drinkers of spirits mostly.
 “ One or two natural born citizens were the whole, out
 “ of upwards of two hundred and twenty, who, in the
 “ space of six weeks, fell victims to this disease. The
 “ natives live chiefly on salted meats and fowls, or other
 “ kinds of poultry, which are killed but a little time
 “ before dressing.” It is unfortunate that among the
 emigrants from cold countries there is a general prejudice
 against salt, as highly inflammatory; and many diseases
 are imputed to the use of it where it is undoubtedly
 entirely innocent. In very cold climates indeed it
 has with great reason been supposed to produce the
 scurvy; and the Tchutski, who conducted capt. Billings
 through their frozen regions, informed him that salt
 was poison in their climate; throwing away, with
 marks of abhorrence, a quantity he had brought with
 him from his frigate. We cannot indeed argue from
 salt being pernicious in a cold climate that it is medicinal
 in a warm one, but we shall soon see that it has
 been recommended in the plague, and may not improbably
 be useful in the yellow fever. At any rate the practice
 of the natives ought in this respect to be a rule for
 emigrants, rather than any theories they may have laid
 down previous to their leaving their own country.

7. In like manner those who newly arrive in a warm
 climate ought to avoid as much as possible the using of
 violent exercise in a heat greater than that to which
 they have been accustomed, and by all means to avoid
 intemperance in spiritous liquors. We are not however
 to imagine from this that such as have been accustomed
 to drink spiritous liquors are all at once to give over
 the use of them, and live a life of abstinence. On this
 subject Mr. Hardie, in his account of the malignant
 fever of 1795, has the following judicious observation:
 “ It has often been said, that temperance was the best
 “ preservative against infection. The observation, in
 “ general, is certainly just; but it may, and during the
 “ late calamity has, been carried too far. For my part,
 “ from

“ from what has come under my own knowledge, I have
“ no hesitation in asserting, that to persons who had
“ been accustomed to live freely, nothing could be more
“ dangerous than to become remarkably abstemious
“ upon the appearance of this disorder. Persons of the
“ above description should, in my opinion, have conti-
“ nued to live in their usual manner; by which means
“ they would have been more likely to repel infec-
“ tion, or if infected, they would have more strength to
“ resist the attack. But, whilst I consider abstinence in
“ such a situation as highly improper, a state of intem-
“ perance is certainly more so; for, were it necessary, I
“ could mention the names of several individuals, who
“ whilst in a state of intoxication were attacked with the
“ fever, and in two days after were tenants of the grave.
“ The fate of such people might be pronounced almost
“ with certainty: they were seized with symptoms of a
“ peculiarly malignant nature, and their death seemed
“ unavoidable.”

On the subject of vegetables much declamation has been used. If we give heed to some, it might almost be supposed that all diseases incident to human nature are owing to the use of animal food. The following paragraphs from Webster's Collection may serve as a specimen: “ We shall not repeat the observations which we
“ have heretofore made, upon the averfeness the Ame-
“ ricans feel for soup and restorative broths, on their eating
“ their meat running with blood, with scarcely any bread,
“ and plenty of heavy potatoes, the only vegetables which
“ are seen on their tables; whilst the French always give
“ the preference to vegetables, and especially to those
“ which are light and wholesome. But we cannot help
“ observing, that, in the months of May, June and July,
“ the streets and markets were seen in the morning fur-
“ nished with an immense quantity of fruits, the most
“ part of which are either green or unripe. In the even-
“ ing all those fruits have disappeared and have been
“ eaten; hence bloody fluxes, dysenteries and bad
“ chyles, which unwholesome food must undoubtedly
“ produce.

“ The

“ The city of Naples contains about four hundred
 “ thousand inhabitants ; of whom thirty or forty thou-
 “ sand are said to belong to the class of beggars. In that
 “ climate the rains prevail, with little intermission, for
 “ three months, from February to May. From May to
 “ September, a drought, equally severe, and scarcely allay-
 “ ed in many years by a single plentiful rain, renders
 “ the heat almost intolerable. The wages of a labourer
 “ not exceeding eight pence this currency a day, and
 “ meat being rarely had in their markets for less than
 “ four pence the pound, and vinous liquors in the same
 “ proportion, the mass of population is excluded from
 “ any share of these luxuries ; of consequence they sup-
 “ port themselves on vegetables, roots, fallads, fruits, &c.
 “ and dilute their food, and animate their spirits, with
 “ water and lemonade. Yet this city has, for a great
 “ number of years, known no general disease. And for
 “ ten years no febrile disease, of any sort, was common
 “ among them. They also pay great attention to per-
 “ sonal cleanliness. Facts of this sort are very important,
 “ and form the best comment on the discordant opinions
 “ of our physicians.”

As a contrast to these the reader may take the follow-
 ing quotation from the Medical Extracts :

“ One gentleman excepted, says Dr. Shebbeare, and I
 “ never saw a gentleman or lady who wholly abstained
 “ from animal food look like other people ; nothing is
 “ so easy to distinguish as a *vegetable man* by his physi-
 “ ognomy, the fittest appellation by which they can be
 “ distinguished ; he neither moves, talks nor looks like
 “ other people ; his face conveys a declaration of his
 “ whole body being out of order, by the lifeless insipidi-
 “ ty which is in it, as his conversation does of his mind
 “ being disturbed, his whole time being taken up in
 “ recounting to the world his manner of living, his feel-
 “ ings, his weak stomach, his disturbed sleep, &c. . . .
 “ If he pretends to have spirits, it is no more than a cer-
 “ tain equability of a lifeless, inanimate state, like that
 “ of the dormouse among animals, or the yew tree in
 “ winter among vegetables,” &c. (Medical Extracts,
 vol. x. p. 234.)

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OR

On the subject of vegetable and animal food we find the following observations in Willich's Lectures on diet, &c. "In the primitive ages, people subsisted chiefly on plants and fruits. Even to this day many nations, the Bramins, for instance, abstain from the use of animal food. The ancient Germans also, who were so renowned for their bodily strength, lived upon acorns, wood-apples, sour milk, and other productions of their then uncultivated soil. In the present mode of life, here (in England) as well as on the continent, a great proportion of the poorer class of country people almost entirely subsist on vegetables. Although these people duly digest their vegetable aliment, and become vigorous, yet it is certain that animal food would answer these purposes much better. Hence, in countries where the labouring class of people live principally upon animal food, they far excel in strength and durability."

On the subject of diet we shall take notice only of one article more, and that is, the use of warm diluting liquors. These are commonly three in number, viz. tea, coffee and chocolate. Abundance of declamations have been published against the use of these, particularly the first; but the daily experience of multitudes shows that its use, in moderation, is perfectly innocent. Indeed when people go to excess with this, as well as any thing else, bad effects must certainly ensue. Zimmerman* mentions a Dutch physician (Bontikoe) who maintained that tea *ought* to be drank in the quantity of *one or two hundred cups* a day! But such ridiculous excesses must make any thing destructive to health; and accordingly this practice, being opposed by Boerhaave, soon fell into disuse. Coffee has the same exhilarating virtue as tea, but must be considerably different in its qualities,

* This author relates the following curious anecdote concerning tea-drinking: "We had a gentleman in Switzerland, who in every respect knew how to assume the tone of majesty. He was told one day that nothing elevated the dignity of a king so much as when every thing around him had a pale look. This intimation was sufficient for him. He directed all his servants to be blooded once a month, and obliged each of them to swallow fifty dishes of tea every day." Tea is said to produce a cadaverous hue in the person who drinks it after bloodletting.

qualities, as having in it a portion of empyreumatic oil extracted by the toasting, and therefore a change from tea to coffee in such as come into a warm country seems to be improper. Chocolate differs considerably from both, possessing no exhilarating virtue, or only in a small degree, but is more nutritive, and in South America constitutes a considerable part of the food. On coming into warm climates it is obvious that the increased perspiration must be supplied by a considerable quantity of diluting liquids; and such of these as the person has been most accustomed to ought to be preferred. For the rest, diluted malt liquors seem preferable to spirits and water. Cyder, though very agreeable when fresh, is apt to become vapid, and even get a putrescent taint. Perhaps a plain infusion of malt, of late found so useful at sea, might also prove beneficial at land, where proper fermented liquors cannot be had.

These modes of prevention are obviously derived from the circumstances which attend every emigrant from a cold to a warm country. The indication must be, to keep themselves as cool as possible, without debilitating the body. It was formerly a custom to use bleeding and purging when people arrived in warm latitudes; but this practice fell into disuse, perhaps without sufficient reason. Dr. Rush attests the efficacy of these remedies as preventives when signs of the disease appeared. "During the existence of the
"premonitory symptoms (says he) and before patients
"were confined to their rooms, a gentle purge, or the
"loss of a few ounces of blood, in many hundred instances prevented the formation of the fever. I did
"not meet with a single exception to this remark." As mercury is found to be one of the best remedies, if not the only one, that can be depended upon for curing the disease after it is once formed, it is natural to think that it would act as a preventive; and accordingly we find, in Dr. Walker's account of the yellow fever in Jamaica, an instance to our purpose. When the fort of Omoa was taken from the Spaniards, a great quantity of quicksilver was carried off by the English. One ship
was

was loaded with it, and, the vessels containing it being broken by the shot of the ship which captured her, a number of men were employed in collecting it with their hands into buckets. Not one of these men was in the least affected with sickness, though a most malignant fever raged among the rest. Preventives of such a powerful nature, however, could not well be adopted without the advice of a physician; it being evidently dangerous for any person unacquainted with medicine to tamper with himself in this way.

When the disease happens to get into a town, it then becomes an object for every person to avoid the danger; and for this Dr. Chisholm has given such instructions as seem to be quite sufficient for any individual, and may be very easily reduced to practice. His observations may be summed up as follows: 1. To avoid going into infected houses. 2. If this cannot be done, to avoid going into the chamber of the sick. 3. If neither of these is practicable, to avoid a near approach to the sick person. 4. To avoid drawing in his breath, or that peculiar smell which issues from the bodies of the sick; and not to touch the bed-clothes. By neglecting this the person becomes affected with nausea: slight rigors and head-ach succeed in a few hours by the disease. 5. Not to touch the patient's body or his wearing apparel, or suffer the effluvia from either to be blown upon the body. The distance at which the contagion acts is by Dr Chisholm supposed not to exceed ten feet; but Dr. Lind thinks it may extend to fifty or sixty feet; but this must depend very much upon circumstances. The only thing that can be done in such cases is to keep at as great a distance as possible. As to the preventives commonly recommended, such as vinegar, camphor, garlic, &c. we have no accounts of their having ever been efficacious in any case; and there is not the least reason to think that they can be so.

To purify rooms or ships from the infection they have received, it has formerly been observed that fumigations with the acid of nitre have been recommended. According to the theory of Dr. Mitchill of New York, however,

however, this mode of prevention must not only be useless but pernicious. The reason is, that according to this gentleman the disease is produced by the very acid in question. His reasoning is shortly this: Putrid substances evolve various sorts of air, two of which by combination form the acid of nitre. Neither of these by themselves are capable of producing fever, though in conjunction they are. Their combination is the acid of nitre, which the Doctor thinks is always that which produces putrefaction. Dr. Girtanner has related an experiment which seems to confirm this opinion, viz. that, having injected some nitrous air into the jugular vein of a dog, the animal died in a short time, and upon opening him his lungs were found of a greenish colour and partly putrid. Dr. Beddoes adds, in a note, that the green colour is a sign of the existence of nitrous acid, not of putridity; but, notwithstanding this, Dr. Girtanner might still have been in the right, as we cannot say that the existence of nitrous acid is incompatible with putridity. But there is not any occasion to enter into a discussion of the question, as the matter seems to be determined by facts which cannot be overthrown. Dr. Carmichael Smyth, in a treatise on the jail fever, considers the disease as proceeding from putrefaction, and “particularly the putrefaction of the *perspirable matter*,* when there is not a renewal of the application of air to carry it off.” With regard to *specific* contagions he thinks they can neither be carried off nor blunted, but by exposure to the open air or to a stream of water; but with *putrid* contagions he believes that they may be destroyed by the mineral acids in a state of vapour. The pernicious qualities of the fumes of sulphur prevented him from making any trials with that substance; but to nitre there was no such objection, and he therefore proceeded in the following manner; the subjects of his trial being the prison wards at Winchester, where the Spanish prisoners were kept, and among whom a typhus fever was making rapid progress: Having divided the
wards

* If this be chiefly composed of fixed air and azote, as has been said in p. 146, it is difficult to see how putrefaction can take place in it.

wards into four parts, he removed the prisoners into three of them, took out of the fourth division all the hammocks and bedding, and had them thoroughly cleaned out. The hammock posts were well washed with diluted spirit of salt. The wards, when dry, were closely shut up, and pots placed in them at different distances, containing from half a pound to a pound of nitre, which was deflagrated by an iron heater put into each pot.* The wards were then shut up for some hours, and when opened were exposed to a free ventilation. The process was repeated twice or thrice, after which the prisoners were likewise cleaned; their old clothes, bedding, &c. taken away, were replaced by others, and none of these were afterwards seized with the fever.

A much more decisive experiment was afterwards made at Sheerness on board the Union hospital ship, where there were upwards of two hundred people sick of a very malignant fever. Previous to the fumigation all the ports and scuttles were shut up. " Sand which had been heated in an iron pot was then scooped into earthen pipkins, into each of which was put a small tea-cup containing about half an ounce of vitriolic acid; to which after it had acquired a proper degree of heat an equal quantity of nitre in powder was gradually added, and the mixture stirred with a glass spatula, until vapour arose from it in considerable quantity. The pipkins were then carried through the wards by the nurses and convalescents who kept walking about with them in their hands, occasionally putting them under the cradles of the sick, and in every corner where any foul air was suspected to lodge. thus the fumigation was continued, until the whole space between decks, fore and aft, was filled with the vapour, which appeared like a thick haze."

The first fumigation was performed in about three hours; the vapour subsided in about an hour, when the ports and scuttles were thrown open for the admission of fresh

* It is not easy to understand this. Nitre cannot deflagrate or burn, unless it be mixed with charcoal, sulphur, or some inflammable substance. The iron heater could only expel the water, with a small proportion of acid.

fresh air. Mr. Menzies, the operator, perceived that even by this first fumigation the air was considerably sweetened; and on repeating the operation next day, which (now that the people were more expert) took up only an hour, such a change was made as the nurses and attendants were very sensible of, and, beginning to put confidence in the remedy, approached the cradles of the sick with less fear. The experiment was further carried on by Mr. Baffan, to whom Mr. Menzies resigned the office of conducting it; and from repeated trials it appeared that the fumigation effectually counteracted the influence of the contagion, though numbers of patients, labouring under the most malignant fevers, were received from the Russian ships of war.

The good effects of nitrous vapour used in this way is also confirmed by Mr. David Paterfon, now surgeon in Montrose in Scotland. The trial took place in the prison wards at Forton. The operation was performed in the manner above related, and with such success, that a ward 57 feet long, 10 feet and an half high, and 20 feet broad, was filled in a quarter of an hour, only by means of three pipkins. The good effects were extremely obvious, and Mr. Paterfon observed that in the wards which had been fumigated at night there was an agreeable smell next morning; and by this smell he was able to discover whether the operation had been properly performed or not. The same author gives several cases in which the good effects of the pure acid vapour of nitre in cleansing putrid ulcers was manifest. A third testimony of the efficacy of this vapour is given in a letter to Dr. Garthshore of London from Mr. James M'Gregor, surgeon to the 88th regiment, in the island of Jersey. The disease was a typhus fever, which had formerly proved very destructive; but, while the acid vapour was used, only one out of *sixty-six* cases proved fatal. Mr. M'Gregor is not only of opinion that the nitrous fume prevented the contagion from acting fatally, but that it destroyed it altogether, so that no more cases appeared. Mr. Paterfon made trial of different acids, but had not completed his experiments: we are informed, however,
in

in the Medical Extracts, that in the year 1795, near about the time that the last experiments were made upon the Union hospital ship, Morveau in France had employed, for the same purpose, oxygenated muriatic acid* in the form of air or vapour, with which he purified the infected hospital at Dijon ; and the same method was afterwards extended to the different military hospitals by a decree of the National Assembly.

This mode of prevention seems to be established on as sure a testimony as any thing can be ; but what can be said that will not be disputed ? Dr. Trotter has argued in the most strenuous manner that such fumigation is not only useless, but pernicious. “ The whole preservative means (says he) are comprised in the immediate removal of the sick ; cleanliness in person and in clothing ; fires to keep the people warm in the winter season ; avoiding cold and moisture, fatigue and intoxication ; and keeping the ship dry and properly ventilated.” To these he also thinks it would be expedient to add a band of music in order to keep up the spirits of the people ; but, with regard to any thing else, he thinks that “ a physician of a fleet, though armed with a diploma, and with the chemistry of the elements at his fingers’ ends, will find that very little has been left for him to do ; whether his doctrine of prophylactics (preventives) be the *vinegar of the four thieves*, or the fumigations of modern physicians, under the scientific appellations of sulphureous gas, muriatic acid gas, or nitrous gas.” The Doctor was so zealous against these noxious fumigations, that he wrote to Evan Nepean, esq. at the Admiralty upon the subject. His argument was, that every possible method was taken on board of vessels to expel *azote* or *mephitic air*, by opening ports, scuttles, &c. and putting down windsails, &c. “ This azote is the base of the nitrous acid : they only differ in the degrees of combination with oxygen, or what was formerly called dephlogisticated air : and in proportion

* Perhaps this vapour may be as efficacious as the other in destroying contagion, but its smell is so extremely offensive and disagreeable to the lungs, that on this account nitrous vapour seems much preferable.

“ proportion to the quantity it attracts of this principle
 “ it is called azote, azotic gas, nitrous gas, nitrous acid,
 “ nitric acid. In short, Dr. Smyth’s preventive is the
 “ very substance that every intelligent officer is hourly
 “ employed to drive from the decks of his Majesty’s
 “ ships.”* This letter was transmitted to the commissioners for the sick and wounded for their report. The answer of the commissioners was to the full as learned as the Doctor’s letter ; but they considered the experiments of Dr. Smyth and others as quite decisive upon the subject, so that Dr. Trotter was obliged to submit. The matter therefore being determined by such high authority, we must take leave of the subject, and proceed to consider the mode of preventing the disease from getting entrance into any town, or of eradicating it when once it has got in.

Among these the enacting and strictly enforcing quarantine laws certainly hold the first place. But these belonging entirely to the magistracy and police of the place cannot be the subject of any discussion here. The success of these has been so great in other countries, that Dr. Willich informs us “ that some of the most ingenious practitioners of Italy and Germany are, at this
 “ moment, employed in a serious attempt wholly to extirpate this contagion (the small pox) from the continent of Europe ; an object which has formerly been
 “ accomplished in the cases of the plague and leprosy.”† Perhaps, then, it is no improbable supposition, that, by a strict observance of quarantine laws, and attention to cleanliness, the yellow fever may be eradicated at least from the northern states, whose climates are less congenial to it than the southern.

Dr. Chisholm informs us that the general plan of prevention made use of in Grenada consists in the destruction of all small wooden buildings ; obliging the inhabitants to build with stone or brick ; to make spacious streets ; to have the rooms of the houses as large as possible ; stables, necessaries, &c. at a distance ; and certain places

* *Medicina Nautica*, p. 329.

† Willich, p. 13.

places appointed as receptacles for filth, to which it must be carried every morning ; slaughter-houses at a distance from the town, &c. with a number of other particulars relative to cleanliness which it is needless to enumerate here ; not forgetting the quarantines, lazaret-tos, &c. without which he does not think any activity on the part of the people can avail.

Dr. Rush, who is an enemy to quarantines, recommends to the people of Philadelphia the following particulars : “ 1. Let the docks be immediately cleaned, “ and let the accumulation of filth in them be prevented in future, by conveying water into them by a passage under the wharves, or by paving them with large “ flag stones inclining in such a manner towards the “ channel of the river as that the filth of the streets shall “ descend from them (after it falls into the docks) into “ the river. This method of paving docks has been “ used with success in the city of Brest. 2. Let every “ ship that belongs to our port be compelled by law to “ carry a ventilator. Let all such ships as are discovered “ to contain foul air in their holds be compelled to discharge their cargoes before they reach our city, and “ let the ships in port be compelled to pump out their “ bilge water every day. 3. Let the common sewers be “ washed frequently with streams of water from our “ pumps. Perhaps an advantage would arise from “ opening them, and removing such foul matters as “ streams of water are unable to wash away. 4. Let “ the gutters be washed every evening in warm weather. “ By frequently washing the streets and pavements the “ heat of the city would be lessened, and thereby one “ of the predisposing causes of the fever would in some “ measure be obviated. 5. The utmost care should be “ taken to remove the filth from the yards and cellars of “ every house in the city. Hog-flies should be forbidden in yards, and the walls of cellars should be white-washed two or three times a year, and their floors “ should be constantly covered with a thin layer of lime. “ Whitewashing the outside of houses in sickly streets “ would probably be useful. 6. Let the privies be emp-
“ tied

“ tied frequently ; and let them be constructed in such
 “ a manner as to prevent their contents from oozing
 “ through the earth so as to contaminate the water of
 “ the pumps. 7. Let all the filth be removed from the
 “ neighbourhood of the city, and let the brick kiln and
 “ other ponds be filled up from time to time with the
 “ earth which is obtained in digging cellars. 8. In the
 “ future improvements of our city, let there be no more
 “ dwelling houses erected in alleys. They are often the
 “ secret receptacles of every kind of filth. 9. The pre-
 “ disposition of our citizens to be affected by the remote
 “ and exciting causes of the yellow fever would be very
 “ much lessened by their living sparingly upon fresh
 “ animal food, and chiefly upon broths and fresh vegeta-
 “ bles, rendered savoury by spices and a small quantity
 “ of salted meat, during the summer and autumnal
 “ months. A constant attention should be paid at the
 “ same time to bodily cleanliness.”

These are the modes of prevention which seem to be the most obvious and necessary, as well as approved by the best judges. It appears, however, that in certain cases neither human skill nor care can prevent or cure the disorder. The number of physicians who have fallen victims to this disease are too manifest proofs of this.* Indeed, when we consider that it is the nature of the distemper first of all to attack the vital parts, and that this attack may commence with little or no pain, it

* Dr. Rush pathetically laments the loss of Dr. Nicholas Way, who had been his intimate friend. In a poem called the *Political Greenhouse* we find some account of the death of Drs. Smith, Cooper and Scandella, who also perished ; and the fates of Drs. Smith and Scandella were connected with one another. Dr. Cooper of Philadelphia was seized with the disease in that city. A friend who attended him sickened during his attendance, and Dr. Cooper, before he had thoroughly recovered, attended in his turn the friend who had taken care of him. A relapse ensued, and the Doctor died. Dr. Smith was intimate with Dr. Scandella of Venice, who had come from thence to America, and was at New York during the time of the fever in 1798. Intending to return to Europe, he waited there for the English packet boat ; but, being informed that a foreign lady in Philadelphia, for whose daughter he had an attachment, was sick of the yellow fever, he returned to that city ; but could not save either mother or daughter from the cruel disease. On Scandella's coming to New York the second time he could find no body that would receive him as a lodger. In this forlorn situation he wrote to Dr. Smith, who instantly gave him an invitation to his house. Here he was seized with the fever, and was attended by Dr. Smith, until the latter also fell sick. A friend who lived in the house attended first Dr. Scandella, and then Dr. Smith, until both died,

it is evident that an attack may be begun before we think of a preventive, and may, as it were in a moment, prevail in such a manner as to be entirely beyond the reach of medicine, before even a medicine is thought necessary. In every case therefore, where the yellow fever prevails, an attention to health becomes as necessary as procuring the means of subsistence. Every precaution must be used, and when we have done so we are not even then secure. We are ignorant of the natural causes which produce it; they are invisible to our senses, and incomprehensible by our understandings. Safety then can only be expected from the protection of that Being to whom all natural causes are known, and to whom all must yield obedience. In short, we may sum up the whole in the well known sentence, "*He that will love life, and see good days, let him refrain his TONGUE from EVIL, and his LIPS that they speak no GUILF. Let him eschew EVIL and do GOOD; let him seek PEACE, and ensue it.*" A very strange receipt indeed, we will say; but how often have we tried it?

The cure of the yellow fever hath been attempted in various ways, according to the theories laid down by different physicians concerning its nature. Dr. Cullen considers it as of the nature of *typhus* fever,* and of consequence would have treated it with antimonials; most probably with his favourite remedy, tartar emetic. Dr. Rush, from his opinion that it is the highest degree of inflammatory fever, recommends powerful evacuants, and large blood-letting, in 1793, and 1797, though he seems to have altered his sentiments in 1798. Dr. Brown, who would have considered it as a disease of debility, would of course have prescribed opium and other stimulants; and lastly, on the theory of Dr. Mitchill, that the disease proceeds from an *acid*, remedies of a nature directly opposite, viz. *alkalies*, ought to be useful. It is not the design of this treatise to enter into any consideration or comparison of the practice of different physicians, but to point out at once, to those who are not physicians, the remedies which have been,

* *Typhus Interoides.*

been, by general consent, accounted most efficacious; and in this respect there is now a surprising unanimity among gentlemen of the medical profession. Those which hold the first rank are,

1. *Mercury*. In the use of this medicine the physicians of the Western world have certainly excelled those of the East. In a paper in the Medical Repository, vol. i, p. 500, Dr. Holyoke of Salem says that the practice of giving mercury was first introduced into New England about 60 or 70 years ago,* by a physician from Scotland, a disciple of the celebrated Pitcairn. In 1734 or 1735 it was used successfully in a very malignant disease called the *throat distemper*, and which he thinks was of the same genus with the *malignant ulcerous sore throat* treated of by Huxham. About 45 years ago it was commonly used in pleurifies and other inflammatory disorders; and, ever since the year 1751 or 1752, it has been used by Dr. Holyoke himself. In Europe, however, the case was exceedingly different; mercury being there generally reckoned pernicious in such disorders, from a notion of its being inflammatory, or dissolving the blood. Thus, on the appearance of the Boullam fever in Grenada, Dr. Chisholm found himself exceedingly at a loss what to do, and he seems to have *invented*, rather than to have been previously *instructed* in, the mercurial practice. His success, however, was very great, provided he could raise a salivation; but in order to do this he was frequently obliged to give much larger doses than he had ever done before, or had any notion of doing. In p. 159 he mentions one patient who took 400 grains before the salivary glands were affected. He tells us, however, p. 271, that, on the re-appearance of the fever in 1794, he gave the medicine in much larger doses than before; beginning with mercury without any previous evacuations which he had used the year before, and with such success that he did not lose a single patient; so that he professes himself almost ready to pronounce it *infallible* in curing the disease. The practice of giving mercury is confirmed by Dr. Rush, and indeed by so many other

* The Doctor's letter is dated December, 1797.

other physicians, that it is superfluous to quote them. Dr. Naffy, formerly mentioned, again stands almost singular in condemning the medicine, because it dissolves the blood ; but it is impossible that any theory, however plausible, can stand against well attested facts. Dr. Rush is indeed very much of opinion that it is easily practicable for people to cure themselves of this disorder, dreadful as it is, provided they take it in time. But by this we must understand, that the very moment the persons feels uneasiness he must apply a remedy, and not trust to *nature* in any case whatever. When the yellow fever prevails, every one who feels the slightest disorder may be assured that his disorder partakes of its nature, and ought immediately to have recourse to a mercurial purge. Dr. Rush says also that bleeding should be first performed. The many disputes, however, concerning the efficacy of this last remedy, must make any person hesitate at the application of it without medical advice, especially as a mercurial purge may be safely taken without it.

2. *Blood-letting.* This was, by Dr. Rush, considered as the capital remedy in 1793 ; but Dr. Chisholm, who made trial of it in the Boullam fever, found that it could not be used with any degree of safety. Dr. Jackson says it is frequently necessary in the Jamaica fever, but it was seldom of use to repeat it. Dr. Walker says it increased the debility in the same fever of 1793, 94 and 95. Dr. Moseley recommends it in the yellow fever of the West Indies, but only in the first stage, and says that the injudicious performance of this operation, when the second stage has come on, has given occasion to the opinion that a patient cannot bear two bleedings. Dr. Coffin found it useful at Newburyport in 1796, in the beginning of the disease, and says it may sometimes be repeated. Repeated bleedings are recommended by Dr. Ouviere of Philadelphia, who says they are not to be omitted even in fat and weak habits. This is confirmed by the editor of the Medical Repository, vol. i, p. 92, who says it was used with success at the hospital in New York in 1796, “ at repeated times, to the amount of “ from 24 to 175 ounces, and in some cases several times “ performed

“performed after the sixth day of the disease, to the great relief of the sick.” Dr. Bruce recommends it in the island of Barbadoes in the robust and plethoric.* Dr. Hillary says that in the same island it is always absolutely necessary, and that it may even be repeated once, but that a third bleeding was seldom necessary. Dr. Wright, in the same island, found the “lancet not only unnecessary but dangerous in the extreme.” Dr. Clarke, in Dominica, found it generally very pernicious, and assures us “that there was not a single instance of an emigrant recovering who had been bled in this disease. In the first 24 hours indeed it was admissible in the young and athletic seized a short time after their arrival, but after that time, or at most after 36 hours, it will always be found prejudicial, if not fatal.” It was not tried by Dr. Bryce on board the *Busbridge*. It is recommended by Dr. Currie in his treatise on bilious fevers.

It is needless to take up time with a detail of more opinions. From those already recited it is natural to conclude that the fever in some places, and at some times, differs very much from others. This is conformable to the opinion of Dr. Currie, who says, that the bilious fever “is amazingly influenced in its aspect and symptoms by the soil, situation, climate, season, and by the preceding and present state of the atmosphere, and the customary mode of living of the inhabitants.” The utility or even safety of blood letting then seems to depend on circumstances which can be only known, and that perhaps with difficulty, at the time; nor can its success in one season be a sufficient argument for the general practice of it in another.

3. *Vomits* have generally been found dangerous. Dr. Moseley, Dr. Rush, and indeed almost all who have practised in this disease, say, that they cannot be ventured upon without extreme caution. Dr. Chisholm, in imitation of the Russian practice in the true plague, attempted the cure of the Boullam fever by vomits; but, as one half of those to whom they were exhibited

* Lind on hot climates.

ed died of the disease, he did not think there was any encouragement to proceed. Perhaps as preventives they might be useful, as it seems probable indeed that any thing must be which tends to cleanse the alimentary canal.

4. *Purgatives* are found extremely useful, both as preventives and medicines. There are innumerable instances where an incipient attack of the disease has been carried off by a brisk purge. Dr. Chisholm was able to remove the slighter cases of Boullam fever by purgatives. He used at first glauber salts with two grains of tartarised antimony, which generally proved emetic as well as purgative ; but he afterwards used with advantage the better purging salts, rendering the solution palatable by the addition of lime juice and sugar. But in all violent cases he would depend on nothing but mercury.

5. *Stimulating medicines.* The stimulants commonly used on the Brunonian plan, viz. opium, bark, &c. are universally owned to be pernicious. In a letter from Dr. Sayres to Dr. Currie,* the former says, that “bark, wine, and a number of the common stimulants, were given on the first appearance of debility taking place ; but with little success. Finding the common round of medicine ineffectual in the advanced state of the disease, I determined (says Dr. Sayres) to use a different mode of treatment. In three cases of adults, two of which had the black vomiting, and the third was in a gore of putrid blood from the mouth and nose, I forbid medicine, and directed very cold water and brandy mixed strong, to be given as freely as possible. It had the happy effect of checking the vomiting in two cases, when the stomach had rejected every kind of mild drink, &c. and, by continuing that practice almost so as to produce high intoxication, for two or three days, these two cases were recovered almost from a state of death. The third was apparently much benefited for three days ; but, being in a high putrescent state when I saw him, and having lost a very considerable quantity of blood from the mouth, nose, &c. he died

* Memoirs of Yellow Fever, p. 137.

"died on the ninth day." In the Boullam fever Dr. Chisholm used the Angustura bark in twelve cases, eight of whom recovered; but, though it was greatly superior to the Peruvian bark, he did not think proper to trust to it in violent cases.

6. *Alkaline remedies.* These have been recommended on the supposition that the yellow fever is occasioned by an acid. Their efficacy is attested by Dr. Jeremiah Barker of Portland, who says that they afforded more relief than any others, and that all the cases accompanied with yellowness ended favourably, but one. The alkaline remedies "would actually alleviate the distressing pain and anguish at the stomach, which would not yield to opiates. The morbid excitement too was evidently under the controul of alkalies; the febrile disturbance appeared to be in a direct ratio to the degree of virulence in the deleterious cause."* We have not any particular details of cases, nor any form of exhibition pointed out. In a dysenteric fever indeed he says that he used a mixture of a quarter of an ounce of salt of wormwood with a pound of lime water; the dose from one to two ounces every hour, once in some cases every half hour, or oftner, in an infusion of camomile.† Calcin'd oyster shells were sometimes given from 40 to 60 grains.

7. *Cooling medicines, external and internal.* The good effects of cold water applied to the body in fevers has long been known. Dr. Jackson observes that it was first introduced at Rome in the infancy of the Methodic sect, and attained afterwards a high degree of celebrity. Its reputation was highly raised by a cure performed on the emperor Augustus; but soon after sunk by the death of Marcellus, the presumptive heir to the empire, to whom it had been improperly prescribed. It was soon after prescribed again, and greatly used by Galen; and after him was in still greater favour with the Arabian physicians; but, since the revival of literature, has been much neglected

* Medical Repos. vol. ii, p. 149.

† In this mixture the fixed air in the alkaline salt would instantly destroy the virtues of the lime water by precipitating the lime. What is sold for salt of wormwood is neither more nor less than common pearl ash.

neglected till of late. In the fever of Jamaica, after the fatal symptoms were removed, Dr. Jackson says, that the tone and vigour of the system was best restored by cold bathing, "which (says he) I am induced to consider as "the most important remedy in the cure of the fevers "of the West Indies, and perhaps in the cure of the "fevers of all hot climates. Though it might not absolutely cut short the course of the disease, yet it seldom failed to change the fatal tendency of its nature." Even in the last stage of the yellow fever, where the patient seems at the utmost extremity, our author tells us that he has alternately employed warm and cold bathing with the greatest success. He has even wrapped the body in a blanket soaked in water in which a large portion of salt had been dissolved, or which had been steeped in brandy or rum, enjoining the liberal use of wine, or more powerful cordials. Dr. Wright also mentions the cold bath with approbation; but, as it cannot be very generally depended upon, its use ought never to supersede that of other remedies, especially mercury; and indeed this may be said of every thing else; for though by the use of the remedies already mentioned the disease has sometimes been subdued, yet the success has never been so great but that every one under an attack of the yellow fever must be considered as in very considerable danger.

In the use of cooling medicines, taken internally, we must have a particular regard to the state of the stomach, which is excessively irritable; and it is surprising that this irritability is of such a nature that, though it will certainly reject the mildest drinks or medicines, it may yet retain others seemingly much more acrid, as has already been observed in the case of Dr. Sayres's patients. As long ago as the time of Diemerbroeck a solution of common salt in vinegar was recommended in the plague. Since that time it has been found extremely useful in the dysentery; and, as in this disease the bowels are likewise in an extremely irritable state, it would seem from analogy that the same medicine might be useful also in the yellow fever. Dr. Wright of Jamaica (who attests the efficacy

efficacy of the medicine in dysentery, belly-ach, remittent fever, and putrid sore throat) gives the following improved method of preparing it: "Take of lime or lemon juice three ounces; of marine salt as much as the acid can dissolve; of any simple distilled cordial water one pint; and of loaf sugar a sufficient quantity to sweeten it. The dose of this mixture must be proportioned to the age and sex of the patient, and to the violence of the disease. A wine glassful may be given to adults every two, four or six hours."

8. *Medicines proper for relieving the most urgent symptoms of the disease.* The most distressing symptoms attending the yellow fever are, head-ach, vomiting, pain in the stomach, and pains in the back, loins and limbs. Blisters were tried by Dr. Chisholm to mitigate the pain in the head. "I have (says he) blistered the whole head, and the inside of each thigh, at once, in several cases, without producing the least change in that or any other symptom. I have had recourse to this remedy to lessen pain, to remove irritability of the stomach, and to raise the vital powers in the low, comatose stage, but always except in two cases without success." In one a blister to the scrobiculus cordis completely removed the irritability; the other case is related in the next section. Another practitioner found a blister applied to the forehead of remarkable use in four cases; but Dr. Chisholm supposes them to have been of the less violent kind. Others have also found them occasionally useful; so that, though dependence cannot be placed upon these remedies, it seems improper to reject them entirely. But the most effectual method of allaying the irritability of the stomach was by the exhibition of vitriolic æther. Dr. Chisholm adopted the medicine on the recommendation of M. Poissonier, and found it to answer the character given of it by him. Dr. Chisholm gave about a tea spoonful in half a glassful of cool water, after which the patient continued undisturbed about two hours, when the dose was repeated. Sometimes, though seldom, the stomach was thus enabled to bear the bark, but otherwise the æther was given every three hours. If the
stomach

stomach retained the bark after the first dose, æther was then given only once in five or six hours. Æther, says he, given in the manner I have mentioned, is extremely grateful to the patient; it occasions an agreeable warmth along the œsophagus, and gently stimulates the stomach. This effect, however, does not continue long; but the frequent production of it at length gives it permanency. It appears to act as a tonic, an antiseptic, and an agreeable stimulant; a warm glow overspreads the surface; and thirst, nausea and oppression, often have fled before it.

These are the remedies most approved, and which may with most reason be expected to succeed in the cure of the disease, where it is *within the power of medicine*. But there are certain cases in which medicines of the ordinary kind cannot act. Sometimes, at the very beginning of the disease, all the three stages of it seem to commence at once, or to be mingled in such a manner that medicines have not time to exert their force. Again, in the last stage, Dr. Jackson compares the attempts to overcome the torpor of the system by medicine, to that of attempting to revive a dead corpse. "I have, however (says he) seen instances of such unexpected recoveries from the most hopeless state in fevers, that I seldom totally despair as long as life remains." It is evident, however, that the remedies employed must be different, according to the different times of the disease. In the beginning it is probable that by bleeding to an extreme degree, so that the greater part of the mass of blood was taken away, the disease might be subdued at once, and the patient recover, as has been already mentioned of the plague, p. 363. But the idea of death seems to be so firmly connected in the human mind with the loss of a great quantity of blood, that very little hopes can be entertained of any good being done in this way. It seems indeed owing to this invincible association of ideas that the enemies of Dr. Rush have found means to load him so much and so undeservedly with reproach. Another method, less exceptionable, though probably also less efficacious, is by injections into the veins. But what are we

to inject? Here, to the disgrace of experimenters, let it be recorded, that such has been their innate propensity to cruelty, that though we know a number of substances which, injected into the veins of an animal, will *certainly* kill it, yet we scarce know one which can be injected with even a *probability* of doing good. In the Medical Extracts indeed we find it related that at Guadaloupe a physician had cured the most inveterate diseases by injecting *certain remedies* into the veins. But what these remedies were we know not. In the same paragraph indeed it is said that alarming symptoms from the bite of a viper were removed by injecting diluted *spirit of hartshorn* into the blood. As the bite of a viper is attended with a dissolution of the blood, and yellowness of the skin, we may thence derive some faint hope that such an injection might also be useful in desperate cases of the yellow fever; but, till further experiments are made, we can say nothing more on the subject.

Lastly, when the disease has proceeded so far that the blood flows out from all parts of the body, and it is evident that the patient must die were it only from the loss of that fluid, then, if ever, the once celebrated remedy of the transfusion of blood may be of use. An account of this remedy has been given in the former part of this work. It must be evident that human blood ought to be preferred to that of a brute creature; but the danger incurred by one who should lose a quantity of blood so near to a person capable of giving the febrile infection must certainly be very great. Nevertheless, there are cases in which the death of a beloved object inspires more horror than the thoughts of any personal danger, or even death itself, to the person who beholds it. In such cases no doubt there are many that would run all risks; and, should any case prove successful, no doubt the person who had the courage to make the experiment would find ample recompense in saving a person he loved from death, and in establishing a truth of such importance to the world in general.*

SECTION

* From the accounts of the most eminent practitioners it appears that the fever of 1798 differed considerably in its nature from that of 1793. In Philadelphia

SECTION IV.

Remarkable Cases.

SO many cases have been enumerated in the course of this work, that little more remains to be done in that way. The following are given, not merely on account of their singularity, or to give instances of surprising and unexpected recovery, but to elucidate some points of doctrine hinted at before, and not sufficiently explained.

1. *Spontaneous*

Philadelphia particularly there were many cases that could not bear the stroke of a lancet. In Boston it seems to have partaken more of the nature of the true plague than in other places and other years. The dissections of Drs. Rand and Warren manifest a difference between the effects of it on the body at that time, and what they were in former years. Buboes, carbuncles, or what were thought to be so, and petechiæ, were observed here, as well as in New York. One remarkable case, related in the next section, shows a disposition to *induration*, very uncommon in the yellow fever, though so common in the true plague that in the former part of this treatise it is taken for the characteristic mark of the disease. None of those eschars called *tokens*, however, were in any case observed. The disease here bore bleeding much better than at Philadelphia; but mercury was always the most efficacious remedy, where a salivation could be raised. The warm bath was used in some cases with success. Large evacuations were useful, and some patients bore three or four bleedings, with repeated doses of jalap and calomel. The distemper is by one gentleman styled a *novel* disease, and differing essentially from other bilious complaints. In one case the patient died of apoplexy; and another would probably have shared the same fate, had it not been for timely bleeding. The black vomit was almost inevitably attended with death. The matter evacuated was thought to be extravasated blood from vessels in some cases mortified. The yellow colour was judged merely accidental; but Dr. Lind's opinion of its arising from a dissolution of the blood seems now to be universally abandoned, and the colour is supposed to arise from a suffusion of bile, owing either to the obstruction of the ducts, or too great secretion.

The names of the gentlemen upon whose authority the above facts stand cannot be mentioned, as permission for so doing has not been obtained. Their authenticity, however, can be proved by undeniable documents.

The origin of the fever at Boston has, as usual, been disputed; but the common opinion is that it was generated. It now appears, however, that, though there are very strong reasons for supposing it to have originated in the place, there are others equally strong for believing that it was imported. It is ascertained that a vessel on board which persons had died with the yellow fever lay in the neighbourhood of the family first seized with the disease in 1798. On the other hand, there were instances of many that were seized with the distemper who had not even left their houses for months previous to the contagious period. This year (1799) there have been unquestionable proofs of the importation of the fever from the Havana. The quarantine, however, has kept the infection from spreading; though the state of the atmosphere has been much less favourable to the disease than last year, and has therefore no doubt contributed to preserve the health of the people.

1. *Spontaneous burning.* In the former part of this treatise several extraordinary instances of this kind are given ; but a doubt was suggested whether the fire was produced

We have been favoured with the following list of those affected with the disease this year at Newburyport :

<i>When taken.</i>		<i>Remarks.</i>
Offytaway	June 23.	A seaman on board the vessel.
* March	23.	do.
* Sol. Haskel	July 3.	On board while her cargo was discharging, &c.
* His nephew	4.	do.
Duggins	5.	{ Present when the ballast was thrown out, also on board.
Tho's Norwood	6.	
Tho's Nor'd jun.	6.	{ Worked in a hatter's shop about 16 rods from the vessel when graving, the wind blowing all or most of the time from the vessel towards the shop.
* Robert Lord	6.	
Stephen Tilton	6.	Worked on the wharf where the vessel was hauled in.
Paine	7.	{ Loaded and stowed the vessel for another outward bound voyage. These men lived at Amesbury.
Herbert	7.	
* Walleigh	7.	{
* Miss Dole	9.	
Sally Wood	10.	Worked in a tailor's shop, by Norwood's hatter's do. [shop.
James Wood	11.	{ Along side the vessel, and filled the old bread casks for her outward voyage. He also lived near the wharf.
Widow Waite	11.	
* Wm. Thompson	11.	{ Doubtful whether her disorder was the fever. Lived at the bottom of the wharf.
Jona. Pearson	13.	
Danl. Favour jun.	15.	{ Lived at the bottom of the wharf, & was along side of the vessel.
Goodhue	15.	
* Rev. Mr. Milton	15.	{ Kept a store near the wharf, & was along side the vessel.
* Mary Dunn	15.	
Giles Parsons	16.	{ Worked near the bottom of the wharf.
* Sol. Currier	16.	
* Sam. Currier	18.	{ On board the schooner, and trimmed the sugar casks.
* Creaty	18.	
Mrs. Wood	19.	{ Helped to haul her in.
* Sally Edwards	19.	
* Her brother	19.	{ On board. Helped to discharge the ballast.
		{ On board when the vessel was discharging her cargo.
		{ Widow of James Wood, above mentioned.
		{ Lived with James Wood.
		{ Lived opposite, & often in, Wood's house during the sickness.

Those marked with asterisks recovered.

" The fever unequivocally the same which prevailed in this town in 1796, and in Boston and Portsmouth the last summer.

" The vessel supposed to have introduced the disease was the schooner Sally, Joseph Gunnison master, which arrived at Bartlett's wharf on the morning of the 29th of June last, after a passage of 18 days, from St. Thomas's, where the yellow fever prevailed and was very mortal, with 17 tierces of sugar, and cash in bags. She discharged her cargo before one o'clock on the day of her arrival. In the same afternoon her stone ballast, taken on board at St. Thomas's, was thrown on deck. On the first of July she was moved to a wharf 10 rods below, and her ballast was thrown on a pier wholly covered with water. This ballast was covered with a viscous substance, which adhered to the fingers, and was very offensive to the people

produced *internally*, or *externally*. The following account, from the Medical Extracts, determines the matter. The circumstance took place in England, in the year 1613. One Hitchill, a carpenter, came home from his work as usual, without being sensible of any indisposition, and went to bed. In the night time, or early in the morning, his wife awaked and found him dead by her side. His body was so hot that it could not be touched, and he continued burning internally for *three days*. No flame appeared on the outside, only an hot steam issued from his body; and we are not told what was the ultimate effect of the fire, or whether his body was consumed to ashes or not. In the same work we are told of a woman who was found dead in her room in the morning, and consumed to ashes, her very bones being calcined to whiteness. The floor on which she lay was very little burned. This last case, however, is not so directly in point as the former, which seems decisive with regard to the internal origin of the fire.

2. *M.*

“ple working on the pier. On the same day she was hauled in between the two wharves, and graved, and removed back to Bartlett’s wharf, where she was loaded with lumber for another voyage, on which she sailed the 11th of July.

“It is still questioned whether this fever was imported, or generated in the town. You will find that all who have had it have been connected with that vessel, or lived or worked near where she lay, or visited the sick near the place where the vessel was graved. And undoubtedly there were many persons alike connected and situated who did not take it, although the inhabitants living near the wharf very soon moved away. It is said that there is an old distil-house near the bottom of the wharf, which has not been used for many years, and that the tubs and cisterns are replete with putrid exhalations. I do not know that this fact has been verified. It is also said that back of the store used by the deceased Jonathan Pearson, were brewers’, soap boilers’ and tallow-chandlers’ works which had all been used in the last spring. This is true; but I do not know that it is evident that any putrid substances were formed there. Dr. Vergnies informs me that there was one case of the yellow fever 2 days before the vessel arrived. In my mind the weight of evidence in favour of the importation greatly preponderates. In 1796 the evidence was very unequivocal that the fever was generated.

“Just before the vessel arrived we had some very warm weather, and the heat was oppressive to the feelings. The thermometer two afternoons was at 90 deg. Perhaps it may not be unuseful to mention that calomel was given liberally. All who recovered were salivated. All who could not be salivated died: and unfortunately some who were evidently salivated died. Since forming my table I find that a Mrs. Plummer who lived near the wharf will die.* Her case for the first seven days was supposed to be an intermittent fever; then it assumed the symptoms of the yellow fever. She was taken on the 11th July.

“* This patient is now dead.”

2. *M. D'Obsonville's case of the plague.* In the former part of this treatise it has been said that heat destroyed the plague ; but, on the authority of the Russian physicians, that the disease could not be treated in hot rooms. The following case, however, shows that even exposure to a burning sun in a desert, to the cold air of night, and to the most injurious usage, cannot always render fatal an attack even of the most dreadful distemper in the world. M. D'Obsonville had undertaken a journey over land to the East Indies, in order to execute an important commission from the French government, in 1761, the very time when the plague raged violently in the east. He describes his case in the following words : “ I felt the first symptoms of the plague two small
 “ days journey from Aleppo, when I had entered the
 “ desert ; and at night, when going to rest, complained
 “ of a general uneasiness and heaviness of the head. In
 “ the morning the fever was known to be inflammato-
 “ ry ; and from that time I had no longer any sleep.
 “ The third, the fever and head-ach became more vio-
 “ lent, two buboes began to rise on my left side, my
 “ tongue was swelled, and of a brown violet colour. The
 “ fourth and fifth days, sores began to appear on my
 “ loins, the spine of my back, and the scrotum ; some
 “ of which were as large as the palm of my hand, and
 “ their colour at first was a red purple. I was obliged,
 “ however, to rise, like other passengers, at two in the
 “ morning, and travel on horseback till eleven. Unable
 “ to swallow any thing but a little water, abandoned by
 “ my Christian servant, who durst not come near me,
 “ and attended by an Arab, that I could not understand,
 “ the violence even of my illness, and a little fortitude,
 “ had hitherto contributed to support me ; but my
 “ weakness increased hourly, and I could no longer sit
 “ my horse, when an Armenian lady, named *Tcheremani*,
 “ determined to ride him herself, and with the utmost
 “ humanity gave up her camel to me, on which was a
 “ kind of litter. On the sixth day the symptoms all
 “ appeared aggravated ; at one moment my pulse beat
 “ with an astonishing quickness, and fire seemed to run
 Z z z “ through

“ through my veins ; and the next, my blood was intercepted in its course, a moisture covered my forehead, and I felt myself fainting, though without being delirious, or losing my senses.”

The caravan having arrived at a small ruined village named *Socum*, in the desert; it was resolved to leave M. D'Obsonville to his fate, his case being considered as desperate ; and indeed he says he was left alone at his own request. A small horde of Arabs resided in that village, though ruined, and our patient was consigned to the care of a religious person called a *moullah*. This gentleman, like too many others, did not choose to *serve God for nought*, and therefore demanded fifty piastras in silver, besides some effects, in recompense for the charity which he was about to extend to the unhappy traveller. Having received those, and the caravan being gone, the moullah and his wife in the night time laid M. D'Obsonville across an ass, and carried him about a mile into the desert, where they left him to shift for himself. Happily, however, either through accident or design, these religious devils had deposited their prey near some water, which undoubtedly, as he still retained his senses, was the means of preserving his life. “ It was there (says he) that, extended upon the earth, with no other succour than a little water, nature laboured to expel the poison by which I was oppressed. One of the buboes burst of itself ; the pestilential sores, which appeared first of a red purple, became yellowish, then brown, and lastly black. These parts then becoming gangrenous, formed hard and thick scabs, which, kernelling and falling away from the quick flesh, left very deep ulcers. This was the first epocha of health ; an abundant suppuration began, and the fever almost immediately left me.”

Having remained alone in the desert for eight or ten days, he was found by chance by some Arabian women, who brought him to their place of residence, washed his sores with water, brought him dried herbs for his bed, and gave him barley bread, butter and curds for his food ; endeavouring besides by their songs to comfort him,

him, and alleviate his distress as much as possible. With these women he remained twenty days, reduced to an extremity of weakness by reason of the discharge from the fores. At last, having learnt a few Arabic words, he prevailed upon two of the husbands to conduct him to Aleppo, about seven days journey distant. He was now mounted astride on a camel (a very hard trotting animal) and by forced marches accomplished the journey in *six* days, when he appeared before the consul, the European merchants, and a crowd of people, in a condition without example; almost naked, with five running buboes, the little covering he had foul, infected with ulcers as long as the palm of the hand, which had eaten away the flesh, and in some places discovered the bones, having besides two holes in the scrotum. From this miserable condition he recovered in a month. It would seem that in some cases the human body, as well as mind, rises superior to every indignity; and that in proportion to the degree of injury and oppression is the tenacity of life, as well as energy of spirit.

3. *Remarkable cure of the plague by exposure to cold and wet.* M. Savary relates that the captain of a vessel informed him that, having touched at Constantinople when the plague was raging there, some of his sailors caught the distemper; two died suddenly, and by assisting them he was infected. "I felt excessive heat" (says he) which made my blood boil; the disease seized my head, and I perceived that I had only a few moments to live. The little remaining reason I had taught me to attempt an experiment. I laid myself, quite naked, all night on the deck; the heavy dews that fell penetrated to my very bones; in a few hours I could breathe freer, and my head was better; my agitated blood became calm, and, bathing the morning after in the sea, I was perfectly cured."

4. *Extraordinary effect of FEAR in rendering the contagion of the SMALL POX effectual.** "A very beautiful girl, twenty-five years of age, servant to captain Morton, had never had the small pox, and had the
" most

* Haygarth's Sketch, vol. ii, p. 405.

" most dreadful apprehensions of that disease. On the
 " twentieth of January, 1791, about four in the after-
 " noon, she was standing near the kitchen fire, when
 " a joiner in the neighbourhood came to the door, which
 " is about sixteen feet from the fire place where the girl
 " stood. Mrs. Morton found fault with the man for
 " not coming sooner to finish some work, and he ex-
 " cused himself by saying his apprentice was ill of the
 " small pox, which had delayed him. The girl imme-
 " diately clasped her hands, and exclaimed, God forgive
 " you, but I will lay my death to you. From that mo-
 " ment she became chilly, then hot and restless. She
 " passed a very bad night, frequently exclaiming, God
 " forgive Calder, he has killed me ; meaning he had
 " given her the small pox. In the morning of the
 " twenty-first I was sent for, and found her very hot, with
 " a quick pulse, great sickness and anxiety. I ordered her
 " an emetic, and assured her she did not need to be in
 " the least alarmed, as she could not possibly have
 " caught the disease. She seemed to be convinced that
 " her fears were groundless ; but next day, the twenty-
 " second, a violent rash appeared ; on the twenty-third
 " the small pox came out, of the worst kind I had ever
 " seen, and she died on the ninth day from the eruption."

5. *Inefficacy of FEAR to render the contagion of YEL-
 LOW FEVER effectual.* Dr. Rush mentions a young
 woman so exceedingly fearful of the disease, that she was
 troublesome to all around her. Afterwards she hap-
 pened to be under the necessity of attending *seven* per-
 sons ill of the fever, and yet escaped unhurt. This
 shows that fear (and the same may be said of any pre-
 disposing cause) is not always sufficient to produce the
 disease. The foregoing case is so extraordinary that
 Dr. Haygarth is of opinion that the patient must have
 been previously infected ; but of this there is no evi-
 dence ; and it is bad reasoning to endeavour to establish
 a fact by our own ignorance. The only argument that
 is or can be used in such cases is, "I cannot understand
 how such a thing could have happened, *therefore it has*
not been so."

6. *Boullanz*

6. *Boullam fever cured by a blister.** The patient was a tradesman in St. George's, Grenada, and had "all the symptoms of the disease except the febrile heat. A blister was applied between the shoulders, without administering any medicine previously except the solution (mentioned p. 530) which operated very moderately. The effect was wonderful; the discharge was uncommonly large, black, and foetid in an intolerable degree; and the instant this took place the patient became better; and soon after, without the use of any other remedy, recovered."

7. *Yellow fever of Barbadoes cured by vomiting.†* The patient was a young man, about twenty-four years of age, surgeon to a Guinea ship. Being a lover of spiritous liquors, he had been drunk three days and nights successively, and in that condition had run races with the sailors on the shore, in the heat of the mid day sun. The last night he slept in the open air under a tamarind tree, and in the morning was seized with the fever, attended with the most violent reaching to vomit, insomuch that he could scarcely answer yes or no to the questions asked him by the Doctor. Sixteen ounces of blood were taken away, which was very florid, thin and dissolved. He was directed then to drink warm water to cleanse his stomach, which he did to the amount of three gallons, which he discharged, together with immense quantities of yellow and blackish bilious matter. He then took a grain and an half of opium, and slept some hours, after which a dose of manna and tamarinds carried off by stool a good deal more of bilious matter, and, with the help of some elixir of vitriol, mint and snakeroot tea, he recovered in a short time.

Dr. Ruth, in a letter published in the newspapers last year, after regretting the inefficacy of bleeding and purging, suspects "that death occurred from the stagnation of acrid bile in the gall-bladder, or its adherence to the upper bowels, as mentioned by Dr. Mitchell in 1741," which he proposes to evacuate by strong emetics

* Chisholm's Essay, p. 169.

† Hillary's Observations, p. 275.

emetics and purgatives, so as to occasion an artificial cholera morbus; and he greatly commends this mode of practice. " Vomits (says he) are old remedies in the " yellow fever of the West Indies. I gave them on the " first day of the disease in the year 1793, and always " without success. They uniformly did harm when " given in the beginning of the fever in its worst grade, " in 1797. The reason of this failure in their efficacy " I now perceive was because they were given *before* the " violent morbid action in the system was reduced or " moderated by bleeding and purging. After this " change is introduced in the disease they are perfectly " safe. The time for exhibiting them should be regulated by the pulse and other symptoms. In moderate " cases of the fever they are as proper in its first stage " as on the 4th day. As there is a blistering point in all " fevers, so there appears to be an *emetic point* in the " yellow fever. It may occur on the second, and it " may be protracted to the sixth or seventh day of the " disease. I have not given the medicine I have mentioned in any case where the patient complained of " pain or burning in the stomach; but I have considered " a nausea, and a moderate degree of puking, as no obstacle to its use; for Dr. Physic has taught me by his " dissections that these symptoms may exist without the " least inflammation in the stomach, and that they have " been absent where the stomach has appeared after " death to have been highly inflamed.

" The cure of the fever should not rest upon a single " dose of the medicine. I have given two doses of it in " a day in several cases, and have given it in one case " every day for three successive days.

" It has often been remarked, that no two epidemics " are exactly alike. They vary not only in different " climates, but in the same climate in different years. " They even vary with the changes of the weather in the " same season. The fever of 1797 differed in several " particulars from the fever of 1793; and the present " epidemic differs materially from both. In many of " the cases I have seen it exceeds the fever of last year in " its

“ its malignity. These variations in diseases call for
 “ corresponding changes in our practice.”

8 *Extraordinary case of yellow fever at Boston in 1798.*

“ The subject of it* was a female of about 24 years of
 “ age, in the 9th month of pregnancy. I saw her on
 “ Monday the 17th of September. She had then a small
 “ but painful hardness on the left parotid gland, which
 “ had commenced some days before, and soon extended
 “ to the lips and neighbouring parts. The centre of the
 “ tumour resembled that of the incision of an arm
 “ about the time of the eruption of the small pox
 “ after inoculation, exhibiting a hard, florid, shining
 “ appearance. I recommended an emollient poul-
 “ tice, hoping to procure suppuration; but, though
 “ they were repeated steadily, not the least evidence
 “ of matter could be produced; and upon each vi-
 “ sit I found the tumour had extended in a rapid and
 “ formidable degree. I was called up in the course of
 “ the night to her, and found her almost suffocated from
 “ the pressure of the tumour on the trachea; for it had
 “ now extended itself to all the muscles and glands of
 “ the neck and face. I changed the poultice for an em-
 “ brocation of the saturnine preparations, which were re-
 “ peated till about 10 o'clock of the following morning,
 “ when she was taken in travail, and soon delivered of
 “ a healthy male child. For a few hours after her de-
 “ livery she appeared something better, but in the night
 “ she grew worse, and about 12 o'clock I was called to
 “ her, when she appeared to be expiring. At the request
 “ of her friends I entered my lancet into the tumour
 “ the length of the instrument; but, as I had expect-
 “ ed, not the least particle of matter flowed, and the
 “ parts were *as hard as a schirrus*. She continued how-
 “ ever in agony till 3 o'clock of the day, and then
 “ expired.”

9. *Two cases of spontaneous origin of yellow fever: from
 the Medical Repository, vol. ii, p. 333.* “ At Salem
 “ (Massachusetts) there was a general prevalence of
 “ health

* The attending physician's name is not mentioned, having no permission to do so.

" health at that season ; though several cases of yellow
 " fever, and some of them fatal ones, occurred. Dr.
 " Oliver very judiciously inclines to the belief that the
 " exemption of this town from the ravages of yellow
 " fever is owing, 1st, to the remarkably clean state of
 " the town ; and, 2dly, to the houses being placed at
 " such distances as to admit of free ventilation. It was
 " observable that the yellow fever had a *spontaneous*
 " origin in two different places of the town, where putrid
 " matters had been suffered to accumulate, and proved
 " fatal to two persons in different families ; these unclean
 " spots forming exceptions to the generally purified
 " state of the town."

10. *Case of fever produced by the effluvia of putrid beef.*
 This took place in the federal garrison on Governor's
 Island.* The subject was a soldier, who had been ex-
 cused from duty on account of a violent and obstinate
 gonorrhœa. On removing him into a lodging without
 the garrison he was seized with symptoms of fever, and
 on the commencement of these the gonorrhœa ceased.
 For four days the fever increased, and was attended at
 last with vomiting, hiccup and delirium. From the
 first commencement of the disease the physician had
 been sensible of a very offensive smell in the patient's
 room. Being assured that this was not owing to want of
 cleanliness, he caused search to be made under it, and in
 the cellars found three barrels of beef so putrid that it
 was with difficulty they could be removed, on account
 of the stench. On removing them, however, the patient
 rapidly recovered, though till then he had constantly
 grown worse.

* Medical Repository, vol. i, p. 210.

A P P E N D I X.

N^o I.

Account of the Plague at Athens, in the time of the Peloponnesian War:—From THUCYDIDES.—SMITH'S Translation.

THE Peloponnesians and their allies, who had made an incursion into Attica, with two thirds of their forces, had not been many days there before a sickness began first to appear among the Athenians, such as was reported to have raged before this in other parts, as about Lemnos and other places. Yet a plague so great as this, and so dreadful a mortality, in human memory could not be paralleled. The physicians at first could administer no relief, through utter ignorance; nay, they died the faster, the closer their attendance on the sick; and all human art was totally unavailing. Whatever supplications were offered in the temples, whatever recourse to oracles and religious rites, all were insignificant: at last, expedients of this nature they totally relinquished, overcome by calamity. It broke out first, as it is said, in that part of Ethiopia which borders upon Egypt; it afterwards spread into Egypt and Libya; and at length, on a sudden, fell on the city of the Athenians. The contagion shewed itself first in Piræus; which occasioned a report, that the Peloponnesians had caused poison to be thrown into the wells; for, as yet, there were no fountains there. After this it spread into the upper city, and then the mortality very much increased. Let every one, physician or not, freely declare his own sentiments about it; let him assign any credible account of its rise, or the causes strong enough, in his opinion, to introduce so terrible a scene. I shall only relate what it actually was, and as, from an information in all its symptoms, none may be quite at a loss about it if ever it should happen again, I shall give an exact detail of them; having been sick of it myself, and seen many others afflicted with it.

This very year, (430 B. C.) as is universally allowed, had been, more than any other, remarkably free from common disorders; or, whatever diseases had already seized the body, they ended at length in this. But those who enjoyed the most perfect health were suddenly, without any apparent cause, seized at first with head-achs extremely violent, with inflammations and fiery redness in the eyes. Within, the throat and tongue began instantly to be red as blood; the breath was drawn with difficulty, and had a noisome smell. The symptoms that succeeded these were, sneezing and hoarseness; and, not long after, the malady descended to the breast, with a violent cough; but, when once settled in the stomach, it excited vomitings, in which was thrown up all that matter which physicians call discharges of bile, attended with excessive torture. A great part of the infected were subject to such violent hiccups, without any discharge, as brought upon them strong convulsions, to some but of a short, to others of a very long continuance. The body, to the outward touch, was neither very hot nor of a pallid hue, but reddish, livid, marked all over with little pustules and sores; yet, inwardly, it was scorched with such excessive heat that it would not bear the slightest covering of the finest linen upon it, but must be left quite naked. They longed for nothing so much as to be plunging in cold water; and many of those who were not properly

perly attended threw themselves into wells, hurried by a thirst not to be extinguished; and, whether they drank much or little, their torment still continued the same. The restlessness of their bodies, and an utter inability of composing themselves to sleep, never abated for a moment. And the body, so long as the distemper continued in its height, had no visible waste, but withstood its rage to a miracle; so that most of them perished within seven or nine days by the heat that scorched their vitals, though their strength was not exhausted; or, if they continued longer, the distemper fell into the belly, causing violent ulcerations of the bowels, accompanied with an incessant flux, by which many, reduced to an excessive weakness, were carried off. For the malady, beginning in the head, and settling first there, sunk afterwards gradually down through the whole body. And whoever got safe through all its most dangerous stages, yet the extremities of their bodies still retained the marks of its violence. For it shot down into their privy members, into their fingers and toes, by losing which they escaped with life. Some there were who lost their eyes, and some who, being quite recovered, had at once totally lost all memory, and quite forgot not only their most intimate friends, but even their own selves. For, as this distemper was in general virulent beyond expression, and its every part more grievous than had yet fallen to the lot of human nature; so, in one particular instance, it appeared to be none of the natural infirmities of man, since the birds and beasts that prey on human flesh either never approached the dead bodies, of which many lay about uninterred, or certainly perished if they tasted. One proof of this is then the total disappearance of fush birds; for not one was to be seen, either in any other place, or about any of the carcases. But the dogs, because of their constant familiarity with man, afforded a more notorious proof of this event.

The nature of this pestilential disorder was in general (for I have purposely omitted many of its varied appearances, or the circumstances particular to some of the infected in contradistinction to others) such as hath been described. None of the common maladies incident to human nature prevailed at that time; or, whatever disorder any where appeared, it ended in this. Some died merely for want of care; and some with all the care that could possibly be taken; nor was any one medicine discovered from whence could be promised any certain relief; since that which gave ease to one was prejudicial to another. Whatever difference there was in bodies in point of strength, or in point of weakness, it availed nothing; all were equally swept away before it, in spite of regular diet, and studied prescriptions. Yet the most affecting circumstances of this calamity were, that dejection of mind which constantly attended the first attack; for the mind sinking at once into despair, they soon gave themselves up without a struggle; and that mutual tenderness in taking care of one another, which communicated the infection, and made them drop like sheep. This latter case caused the mortality to be so great. For, if fear withheld them from going near one another, they died for want of help; so that many houses became desolate for want of needful attendance; and if they ventured, they were gone. This was most frequently the case of the kind and compassionate. Such persons were ashamed, out of a selfish concern for themselves, entirely to abandon their friends, when their menial servants, no longer able to endure the groans and lamentations of the dying, had been compelled to fly from such a weight of calamity. But those, especially, who had safely gone through it, took pity on the dying and the sick, because they knew by themselves what it really was, and were now secure in themselves; for it never seized one a second time so as to be mortal. Such were looked upon as quite happy by others, and were themselves at first overjoyed in their late escape, and the groundless hope that hereafter no distemper would prove fatal to them. Besides this reigning calamity, the general removal from the country into the city was a heavy grievance, more particularly to those who had been necessitated to come thither. For, as they had no houses, but dwelled all the summer time in booths, where there was scarce room to breathe, the pestilence destroyed them with the utmost disorder, so that they lay together in heaps, the dying upon the dead, and the dead upon the dying. Some were tumbling over one another in the public streets, or lay expiring about every fountain, whither they had crept to assuage their extraordinary thirst. The temples.

in which they had erected tents for their reception, were full of the bodies which had expired there. For, in a calamity so outrageously violent, and universal despair, things sacred and holy had quite lost their distinction. Nay, all regulations observed before in matters of sepulture were quite confounded, since every one buried where he could find a place. Some, whose sepulchres were already filled by the numbers which had perished in their own families, were shamefully compelled to seize those of others. They surprised on a sudden the piles which others had built for their own friends, and burned their dead upon them; and some, whilst one body was burning on a pile, tossed another body they had dragged thither upon it, and went their way.

Thus did the pestilence first give rise to those iniquitous acts which prevailed more and more in Athens. For every one was now more easily induced openly to do what for decency they did only covertly before. They saw the strange mutability of outward condition; the rich entirely cut off, and their wealth pouring suddenly on the indigent and necessitous; so that they thought it prudent to catch hold of speedy enjoyments and quick gusts of pleasure; persuaded that their bodies and their wealth might be their own merely for the day. Not any one continued resolute enough to form any honest or generous design, when so uncertain whether he should live to effect it. Whatever he knew could improve the pleasure or satisfaction of the present moment, that he determined to be honour and interest. Reverence of the gods, or of the laws of society, laid no restraints upon them; either judging that piety or impiety were things indifferent, since they saw that all men perished alike; or, throwing away every apprehension of being called to account for their enormities, since justice might be prevented by death; or rather, as the heaviest judgment to which man could be doomed was already hanging over their heads, snatching this interval of pleasure before it fell.

N^o II.

Account of the Great Plague in the time of JUSTINIAN:—
By PROCOPIUS.

THIS was a plague which almost consumed mankind; of which Procopius concludes there was no other cause than the immediate hand of God himself. For it neither came upon one part of the world alone, nor in one season of the year; whence subtle wits (as he saith) might make pretensions. It afflicted the whole world, and all conditions of men, though of never so contrary a nature and disposition; sparing no constitution nor age. The difference of men as to their places of dwelling, diet, complexions, inclinations, &c. did no good in this disease. Some it took in summer, some in winter, and others in other seasons. It began among the Egyptians in Pelusium, and spread to Alexandria, with the rest of Egypt, one way, and the other to those parts of Palestine which border upon Egypt. From thence it travelled to the utmost bounds of the world, as by set journies and stages, making destruction its only business, and sparing neither island, cave, nor top of mountain, where mankind inhabited; for, if it leaped over a country, returning afterwards, it left it no cause to rejoice above its fellows. It began still at the sea coast, and thence went to the inland parts. In the second year of its progress it arrived at Constantinople, about the middle of the spring, where it was the fortune of Procopius then to reside. Apparitions of spirits, in all shapes human, were seen by many, who thought the man they met struck them in some part of the body; and so soon as they saw the spirit they were seized with the disease. At first when they met them they repeated divine names, and fled into churches, to no purpose. Afterwards they were afraid to hear their friends call them, locking themselves up in their chambers, and stopping their ears. Some dreamed they saw such sights; others that they heard a voice tell them they were enrolled among the number of those appointed to die.

But

But most, without warning, became feverish suddenly : their bodies changed not colour, nor were hot ; the fever being so remiss till evening, that neither the patient nor physician, by his pulse, could apprehend any danger. Yet to some the same day, to others the next, or many days after, arose a bubo, either in the groin, the armpit, under the ear, or in other parts. These were the general symptoms which happened alike to all the visited persons.

There were others different ; whether made so by the diversity of bodies, or by the will and pleasure of him that sent the distemper, our author cannot say. Some were seized with drowsiness and slumbering, others with a sharp distraction. The slumberers forgot all things : if they were looked to, some would eat ; some, that were neglected, starved to death. Those who were distracted were vexed with apparitions ; crying there were men to kill them ; and running away ; being so troublesome and unruly that their keepers were pitied as much as they themselves. No physician or other caught the disease by touching sick or dead bodies ; many strangely continuing free, though they tended and buried infected persons, and many catching it they knew not how, and dying instantly. Many leapt into the water, though not from thirst ; and some into the sea. Some, without slumbering or madness, had their bubo gangrened, and died with extreme pain ; which doubtless also happened to those who had the phrensy, though, being not themselves, they understood it not. Some physicians hereupon, conceiving the venom and head of the disease to lie in those plague sores, opened the dead bodies, and, searching the sores, found an huge carbuncle growing inward. Such whose bodies were spotted with black pimples, the bigness of a lentile, lived not a day. Many died vomiting blood. Some that were given over by the most eminent physicians unexpectedly recovered ; others, of whose recovery they thought themselves perfectly secure, suddenly perished. No cause of this sickness could be reached by man's reason. Some received benefit by bathing, others it hurt. Many died for want of relief, others escaped without it. In a word, no way could there be found of preservation, either by preventing the sickness, or of mastering the disease, no cause appearing either of their falling sick or recovery. Women with child, who were visited, certainly died ; some miscarrying, some fairly delivered, and perishing with their children. Three women only were safely brought to bed and recovered, their children dying ; and one died whose child had the hap to live. Such as had their sores great, and running plentifully, escaped ; the violence of the carbuncles being thereby assuaged ; and this was the most certain sign of health. Such whose sores staid as they first arose, underwent the miserable accident formerly mentioned. Some had their thighs withered, when the sores rose upon them and did not run. Some escaped with diminished tongues, and lived stammering, or uttering sounds without distinction, all their days. In Constantinople the pestilence lasted four months ; raging three months with all extremity. In the beginning few died more than usual. Then, growing hotter and hotter, it came to five, and at last to ten thousand every day. At first they buried their dead carefully ; but at length all came to confusion, and many lay long unburied ; servants were without masters ; rich men had none to attend them. In the afflicted city little was to be seen but empty houses, no trade going, or shops open.

N^o III.

Account of the Plague at London in 1665. — From Dr. HODGES and others.

IN the beginning of September 1664 the people of London first became alarmed by a report of the plague being broke out in Holland, where it raged violently the former year. The United Provinces had received it from some place in the Levant, and, certain accounts having been received of the distemper

distemper being in Holland, several councils were held by government with a view of concerting means for preventing its introduction into Britain. These were held privately, and it does not appear that any thing was positively determined upon; but thus the knowledge that such a distemper existed in Holland was suppressed, and the public fears dissipated until the beginning of December; when two, supposed to be Frenchmen,* in Long-acre, or rather the upper end of Drury lane, died with such suspicious symptoms that the people of the house endeavoured to conceal the distemper of which they died. The secretaries of state, however, having got intelligence of the matter, caused their bodies to be inspected, when it became evident they had died of the plague. This produced a general alarm; Dr. Hodges says, that "hereupon some timorous neighbours, under apprehensions of a contagion, removed into the city of London; who unfortunately carried along with them the pestilential taint; whereby that disease, which was before in its infancy, in a family or two, suddenly got strength, and spread abroad its fatal poison; and, merely for want of confining the persons first seized with it, the whole city was irrecoverably infected." The author of the Journal, however, says that the public fear again subsided, though it had been still farther raised by the death of another person in the same house about the latter end of December; but, as no more died for six weeks, no farther notice was taken of it until the 12th of February, when one died in another house, but in the same parish. Soon after this an increase was observed in the weekly list of burials at St. Giles's parish, which augmented the general alarm so much that few cared to pass through Drury lane or the suspected streets, unless upon very urgent business. In a short time a like augmentation was perceived in the bills of the adjoining parishes, and indeed all over the town. The Journal informs us that the usual number of burials within the bill of mortality was from 240 to 300; but from the 20th of December to January 24th they had gradually arisen from 291 to 474. This seems inconsistent with what he had before said of the alarm having ceased till the 12th of February; but we shall take his own words. "This last bill (474) was really frightful; being a greater number than had been known to have been buried in one week since the preceding visitation of 1656. However, all this went off again, and the weather proving cold, and the frost, which began in December, continuing very severe, even till near the end of February, attended with sharp though moderate winds, the bills decreased again, and the city grew healthy, and every body began to look upon the danger as good as over; only that still the burials in St. Giles's continued high. From the beginning of April especially, they stood at 25 each week, till the week from the 18th to the 25th, when there were buried in St. Giles's parish 30; whereof were two of the plague, and eight of the spotted fever, which was looked upon as the same thing; likewise the number that died of the spotted fever on the whole increased; being eight the week before, and twelve the week above named."

Thus a new and still greater alarm was produced, which was yet farther augmented by the spreading of the distemper. The journalist says indeed that only a few were set down in the lists as having died of the plague; the remainder of the deaths being charged to other distempers; and accordingly one week, when the mortality bill was high, and only 14 charged to the plague, he says, "this was all knavery and collusion; for in St. Giles's parish they buried 40 in all; whereof it was certain that most of them died of the plague, though they were set down of other distempers; and though the number of all the burials was not increased above 32, and the whole bill being but 385, yet there were 14 of the spotted fever, as well as 14 of the plague; and we took it for granted upon the whole that there were 50 died of the plague that week. The next bill was from the 23d of May to the 30th, when the number of the plague was 17; but the burials in St. Giles's were 53; a frightful number, of whom they set down but nine of the plague; but, on examination more strictly by the justices of the peace, and

“ 22

* *Journal of the Plague Year.*

“at the lord mayor’s request, it was found there were 20 more who were really dead of the plague in that parish, but had been set down of the spotted fever, or other distempers, besides others concealed.”

The account given by Dr. Hodges is somewhat different from the above. He informs us that “a very hard frost began in December, and continued three months, which seemed greatly to diminish the contagion, and very few died during that season; though even then it was not totally extinguished.” The journalist says that in this intermission of the plague there was a difficulty which he could not well get over. The first person who died of the plague he says (p. 234) was on December 20th, or thereabouts, 1664, though he had told us before (p. 2) that it was the end of November, or *beginning* of December the same year. “But after this (continues he) we heard no more of any person dying of the plague, or the distemper being in that place, till the 9th of February, which was about seven weeks after; and then one more was buried out of the same house: then it was hushed, and we were perfectly easy as to the public for a great while, for there were no more entered in the weekly bill to be dead of the plague, till the 22d of April. Now the question seems to be thus: Where lay the seeds of the infection all this while? How came it to stop so long, and not to stop any longer? Either the distemper did not immediately come by contagion from body to body, or, if it did, then a body may continue to be infected without the disease discovering itself many days, nay, weeks together. It is true there was a very cold winter, and long frost, which continued three months; and this, the Doctors say, might check the infection; but then the learned must allow me to say that if, according to their notion, the disease was, as I may say, only frozen up, it would, like a frozen river, have returned to its usual force and current when it thawed; whereas the principal recess of the infection, which was from February to April, was after the frost was broken, and the weather mild and warm. But there is another way of solving all this difficulty, which I think my own remembrance of the thing will supply; and that is, the fact is not granted, namely, that there died none in those long intervals, viz. from the 20th of December to the 9th of February, and from thence to the 22d of April. The weekly bills are the only evidence on the other side, and those bills were not of credit enough, at least with me, to support an hypothesis, or determine a question of such importance as this; for it was our received opinion at that time, and I believe upon very good grounds, that the fraud lay in the parish officers, searchers, and persons appointed to give account of the dead, and what diseases they died of; and, as people were very loth at first to have the neighbours believe their houses were infected, to they gave money to procure, or otherwise procure, the dead persons to be returned as dying of other distempers; and this, I know, was practised afterwards in many places; I believe I might say in all places where the distemper came; as might be seen by the vast increase of the numbers placed in the weekly bills under other articles of diseases, during the time of the infection. For example, in the months of July and August, when the plague was coming on to its highest pitch, it was very ordinary to have from 1000 to 1200, nay to almost 1500, a week, of other distempers: not that the numbers of those distempers were really increased to such a degree; but the great number of families and houses where really the infection was, obtained the favour to have their dead returned of other distempers, to prevent the shutting up of their houses.”

The disease continued to advance, but with such intervals and remissions as frequently gave hopes of its disappearing entirely. Nevertheless, about the beginning of May the inhabitants began to leave the city in great numbers. The journalist, for his own part, was irresolute; and sometimes would have left the city with the rest, had it not been for the impossibility of finding an horse; for, (says he) though it is true that all the people did not go out of the city of London, yet I may venture to say that in a manner all the horses did; for there was hardly a horse to be bought or hired in the whole city for some weeks.” Many fled on foot, carrying with them soldiers’ tents, in which they slept in the fields, it being then warm weather, and no danger of taking cold. This way of living was also familiar in some degree by reason of the

wars which had preceded; multitudes of those who had served in them being at that time in London. This our author greatly approves of as a method of preventing the infection from spreading, and thinks that, had it been more generally practised, much less damage would have been done in the country than happened at the time from this dreadful distemper.

Early in June the court thought proper to remove to the city of Oxford, whither the infection did not reach. The people still continued to remove during the whole month of July, though in smaller numbers than before; but in August the multitude of fugitives so increased that, says our author, "I began to think there would be none but magistrates and servants left." He informs us also that at the breaking out of this plague the city was unusually full of people; vast numbers who had served in the wars, or who, in times of trouble, had been friends to royalty, had flocked into it on the restoration of Charles II, in hopes of reaping some fruit of their former labours and sufferings; so that on the whole he supposes there must have been upwards of an hundred thousand people more than usual in the city. Indeed, if we are to believe that, on a representation of the state of the poor to the lord mayor, it appeared that there were an hundred thousand ribband weavers in Spittle-fields, we must look upon the population of London at that time to have been incredibly great; and when the journalist computes the number of those who fled only at two hundred thousand, we must certainly suppose it to have been greatly underrated.

As the plague continued to become more and more violent, the magistrates thought proper to take some means for separating the infected from the healthy; but unhappily their mode of procedure was such as inspired both the infected and uninfected with the utmost terror. The houses were marked with a red cross, subscribed with the words "LORD, HAVE MERCY UPON US!" in large letters. They were continually guarded, day and night; and none were allowed access to the sick, to give them either food or medicines, excepting those who guarded them; nor were the sick themselves allowed to go abroad until forty days after their recovery. But, though the distemper continually advanced, it did not get to its full height until the months of August and September. Before this time it seemed to fly from place to place; so that great hopes were entertained, though always without foundation, of its total removal; but now it invaded the whole city. Four or five thousand died in a week; once eight thousand; and, in the month of September, for some time, twelve thousand a week died. The city was reduced to the extremity of distress.

The author of this journal had the courage not only to remain in the city, during the whole time of the infection, but even took many solitary walks to the house of his brother, who had removed into the country, in order to preserve his goods from being stolen. At first he went every day, but afterwards only once or twice a week. He tells us also that he took many walks out of curiosity; and, though he generally came home frightened and terrified, he could not restrain himself. "In those walks (says he) I had many dismal scenes before my eyes; as particularly of persons falling dead in the streets, terrible shrieks, and screamings of women, who, in their agonies, would throw open their chamber windows, and cry out in a dismal, surprising manner.

"It is scarce credible what dreadful cases happened in particular families every day; people in the rage of the distemper, or in the torment of their swellings, which was indeed intolerable, running about raving and distracted; and oftentimes laying violent hands upon themselves, throwing themselves out at their windows, shooting themselves, &c. mothers murdering their own children, in their lunacy; some dying of mere grief as a passion; some of fright and surprise, without any infection at all; others frightened into idiotism and foolish distractions, some into despair and lunacy; others into melancholy madness."

The distemper was found to rage so violently among the poorer sort, that we are told by Dr. Hodges, some gave it the name of the *poor's plague*. This is confirmed by the journalist, who informs us that "the misery of that time lay chiefly upon the poor, who, being infected, had neither food nor physic; neither physician nor apothecary to assist them, nor nurse to attend them:

“ them : many of those died calling for help, and even for sustenance, out of
 “ their windows, in a most miserable and deplorable manner ; but it must be
 “ added, that, whenever the cases of such persons or families were represented
 “ to the lord mayor, they were always relieved.” Indeed the charity of the
 more opulent, upon this occasion, almost exceeds belief. Dr. Hodges informs
 us, that “ though the more opulent had left the town, and it was left almost
 “ uninhabited, the commonalty who remained felt little of want ; for their
 “ necessities were relieved with a profusion of good things from the wealthy,
 “ and their poverty was supported with plenty.” The probable reason of such
 devastation among the poor, Dr. Hodges promises, p. 15, to give, and does
 not ; at least I have not been able to find it in his book ; I must therefore
 content myself with what the journalist (though no physician) has delivered
 on this subject. He says, that when people began to use proper cautions, the
 danger of infection was the less. “ But (says he) it was impossible to beat any
 “ thing into the heads of the poor ; they went on with the usual impetuosity
 “ of their tempers ; full of outcries and lamentations when taken, but madly
 “ careless of themselves, fool-hardy and obstinate when well : where they
 “ could get employment, they pushed into any kind of business, the most dan-
 “ gerous, and the most liable to infection ; and, if they were spoken to, their
 “ answer would be, I must trust to God for that ; if I am taken, then I am
 “ provided for, and there is an end of me, or the like ; or thus : Why, what
 “ must I do ? I cannot starve ; I had as good have the plague, as perish for
 “ want. I have no work, &c. This adventurous conduct of the poor was
 “ what brought the plague among them in a most furious manner ; and this,
 “ joined to the distress of their circumstances, when taken (with the distem-
 “ per) was the reason why they died so in heaps : for I cannot say that I
 “ could observe one jot of better husbandry among them, I mean the labour-
 “ ing poor, while they were well and getting money, than there was before ;
 “ but as lavish, as extravagant, and as thoughtless of to-morrow, as ever ; so
 “ that, when they came to be taken sick, they were immediately in the ut-
 “ most distress, as well for want as for sickness, as well for lack of food as
 “ lack of health.”

In the time of so great a calamity, the magistrates exerted themselves as far
 as their power and skill would permit, to lessen the sufferings of the people.
 It was natural also in such a dreadful emergency to call upon the physicians
 to exert themselves. Accordingly the king (Charles II) by his royal author-
 ity commanded the College of Physicians of London jointly to write some-
 what in English, that might be a general directory in this calamitous exigence ;
 nor was it satisfactory to this honoured society to discharge their regards for
 the public in that only ; but some were chosen out of their number, and ap-
 pointed particularly to attend the infected on all occasions ; two also out of the
 court of aldermen were required to see this hazardous task executed.*

Our author then proceeds to mention the names of some who were employed
 in this laudable undertaking ; particularly Dr. Clifton, regius professor at
 Cambridge, Dr. Nathaniel Paget, Dr. Wharton, Dr. Berwick and Dr.
 Brookes ; many others he says were employed ; “ but (he adds) eight or nine
 “ fell in the work, who were too much loaded with the spoils of the enemy ;
 “ among whom was Dr. Conyers. &c. After, then, all endeavours to restrain
 “ the contagion had proved of no effect, we applied ourselves altogether to the
 “ cure of the diseased.”

We shall not doubt of the good intentions of the physicians : of their success
 we may judge from what Dr. Hodges himself says, that many died while pre-
 scribing cures for others. To the same purpose the journalist, p. 43 : “ I
 “ shall not be supposed to lessen the authority or capacity of the physicians,
 “ when I say that the violence of the distemper, when it came to its extremity,
 “ was like the fire the next year (1666). The fire, which consumed what the
 “ plague could not touch, defied all the application of remedies ; the fire-en-
 “ gines were broken, the buckets thrown away, and the power of man was
 “ baffled and brought to an end ; so the plague defied all medicine ; the
 “ very physicians were seized with it, with their preservatives in their mouths ;
 “ and

* Hodges, p. 15, & seq.

“ and men went about prescribing to others, and telling them what to do, till the tokens were upon them, and they dropped down dead, destroyed by that very enemy they directed others to oppose. This was the case of several physicians, even some of the most eminent, and of several of the most skilful surgeons; abundance of quacks too died, who had the folly to trust to their own medicines,” &c.

Thus, in defiance of every effort of human skill, the calamity continued. The contagion (says Dr. Hodges) spread its cruelties into the neighbouring countries; for the citizens, who crowded in multitudes into the adjacent towns, carried the infection along with them, where it raged with equal fury; so that the plague, which at first crept from one street to another, now reigned over whole counties, leaving hardly any place free from its insult, and the towns upon the Thames were more severely handled; not, perhaps, from a greater moisture in the air from thence, but from the tainted goods rather, that were carried upon it: moreover some cities and towns, of the most advantageous situation for a wholesome air, did, notwithstanding, feel the common ruin. Such was the rise, and such the progress, of this cruel destroyer, which first began at London.”*

But it is now time to turn from those scenes of horror. The power of the pestilential contagion was not absolutely *immeasurable*. It had its rise, its progress, its state and declension. Dr. Hodges tells us that, *when “ the worst part of the year was over, and the height of the disease, the plague by leisurely degrees declined, and before the number infected decreased, its malignity began to relax, inasmuch that few died, and those chiefly such as were ill managed; hereupon that dread which had been upon the minds of the people wore off; and the sick cheerfully used all the means directed for their recovery; and even the nurses grew either more cautious, or more faithful; inasmuch that after some time a dawn of health appeared, as sudden, and as unexpected, as the cessation of the following conflagration; wherein, after blowing up of houses, and using all means for its extinction to little purpose, the flames stopped as it were of themselves for want of fuel, or, out of shame, for having done so much mischief. The pestilence, however, did not stop for want of subjects to act upon, (as then commonly rumoured) but from the nature of the distemper. Its decrease was, like its beginnings, moderate, &c. About the close of the year, that is, on the beginning of November, people grew more healthful,” &c.*

The numbers who perished in this violent plague are so variously reported that nothing certain can be said concerning it. Dr. Morton says that upwards of forty thousand died; but from the foregoing accounts it is evident that this calculation must be prodigiously underrated. The journalist indeed gives strong reasons for believing that all the accounts of the numbers who perished were much below the truth. He thinks that an hundred thousand at least must have fallen victims to it; and if his own assertion be true, that thirty thousand died in the last three weeks, we cannot suppose but that three times that number died in the course of the twelvemonth that the disease lasted; which would fix the calculation at 120,000. This great mortality however was soon forgot; as soon as the danger was over, the ravages it had committed were no longer an object of terror. The disease had its usual effect, viz. increasing the desire of the sexes for each other. “ They had the courage (says Dr. Hodges) now to marry again, and betake to the means of repairing the past mortality; and even women before deemed barren were said to prove prolific; so that, although the contagion had carried off, as some computed, about one hundred thousand, after a few months their loss was hardly discernible.”

* Hodges, p. 25.

N^o IV.*Account of the Plague at Marseilles in 1720:—From the Periodical Publications of the time.*

SO much hath been said concerning this plague, in the first part of this treatise, that no particular detail is requisite here. In its symptoms it differed little if any thing from the plague of London, described in the former number. Many died without any previous sickness; and, while the distemper continued severe, few outlived the third day; and so infectious was its nature, that one person in a family was seldom attacked without its successively attacking all the rest. The bodies were said to putrefy in 24 hours. Very considerable sums of money were collected here, as well as in London. The conduct of the bishop on this melancholy occasion has been greatly celebrated by many; among others by Dr. Darwin, in his *Botanic Garden*, in the following lines:

“ So when Contagion, with mephitic breath,
 “ And wither’d Famine, urg’d the work of death;
 “ * Marseilles’ good Bishop, London’s gen’rous Mayor,
 “ With food and faith, with medicine and with prayer,
 “ Rais’d the weak head, and stay’d the parting sigh,
 “ Or with new life relum’d the swimming eye.

“ * The bishop of Marseilles, during the time of this miserable calamity, was indefatigable in the execution of his pastoral office, visiting, relieving, encouraging and absolving the sick with extreme tenderness; and though perpetually exposed to the infection, like Sir John Lawrence, the lord mayor of London in 1665, was never seized with the disease.—This last gentleman, with undaunted resolution, continued in the city during the whole time of the calamity, executing the duties of his office with the utmost punctuality. The day after the disease was certainly known to be the plague, above 40,000 servants were dismissed, and turned into the streets to perish, for no one would receive them into their houses; and the villages near London drove them away with pitchforks and fire-arms. Sir John Lawrence supported *them all*, as well the needy as those who were sick; at first by expending his own fortune, till subscriptions could be solicited and received from all parts of the nation.” (*Darwin’s Botanic Garden. Loves of the Plants, canto ii, p. 61.*)

N^o V.*Account of the Plague in Syria, Cyprus &c.—From Dr. PATRICK RUSSEL’S Treatise.*

THIS plague was preceded by violent cold, famine, and earthquakes. In 1759 it began in Egypt, having been imported in a vessel from Constantinople. From Alexandria in Egypt it was brought by some Jews to Saffat, a village in Syria, near Aleppo, which had suffered much by the earthquake; which last was for some time thought to have been the cause of the distemper; but, when its nature was really discovered, they comforted themselves with the thoughts that an *Egyptian* plague was less to be dreaded than one which came from the north-west.

The distemper had been introduced into Cyprus as early as April 1759, by a vessel from Constantinople, wrecked on the coast; and, having thus got a footing in Egypt, Syria and Cyprus, its progress was marked with the usual

usual mortality. In Egypt the Europeans in Cairo remained in confinement till the middle of July; a space considerably longer than usual. Next year they shut up on the 9th of March, but were released on the 24th of June. The distemper raged in the city with such fury during 1759 and 1760, that in the two years four hundred and fifty thousand were computed to have perished; a number, however, which Dr. Russel thinks must have been exaggerated. Cairo had been free from plague during the whole of this century before, except in the year 1736, when the distemper raged with such violence that ten thousand were said to have perished in one day. It was supposed to have been brought from Upper Egypt. In Cyprus it broke out at the village of Limsol, where it destroyed four hundred people. During the hot months of July, August and September the infection showed itself so little that it was thought to have been extinguished; but in October it not only reappeared in the places where it had before showed itself, but invaded Nicosia, the capital of the island. Endeavours were used, by burying the dead bodies in the night, to conceal the existence of the distemper; but this soon became impracticable. Towards the end of January, 1760, it raged so dreadfully in this city that the Mahometans were enjoined to use prayers and processions to avert the wrath of Heaven. The crowds brought together on this occasion spread the distemper still more wide, and in the following month its ravages began at Larnica, a small town considerable for its trade, and which, though alarmed, had hitherto kept free, even though infected persons had been freely admitted. Here it raged with uncommon malignity, inasmuch that few of those recovered that were infected during the month of March. It continued to prevail till the month of April, when it spread to the very eastern extremity of the island, into the province of Carpass; a thing hitherto unknown.

Two examples of apparent insusceptibility are related; one was a young Greek, whose constant employment was, to nurse the sick, and assist at the burials; the other, a Greek woman, who, having with great affection nursed her husband and two daughters who died of the plague, continued with admirable courage to expose herself in assisting the sick in the neighbourhood.

Towards the end of May the infection was rapidly decreasing; the Europeans came out of their confinement in the month of July, and the plague at last ceased, after having destroyed 70,000 persons; nearly one half of the whole population.

In Syria the plague appeared first in October, 1759, in the village of Saffat. From thence it proceeded to Tripoli, where it began about the middle of January, and did not decline till July; neither were the Europeans thoroughly released from their confinement till towards the end of August. One half of those infected are said to have recovered; but five thousand perished. The city remained free from any attack during the whole of 1761; but early in 1762 the distemper again made its appearance in the neighbouring villages, and again began its devouring ravages; but, though a free access was granted to infected persons in the city, it does not appear that any general infection took place.

In Latakea the distemper appeared in March, 1760, made considerable progress during the month of April, increased from the 17th of that month to the 13th of May, raged with great violence from that time to the 27th of June, when it suddenly decreased, the funerals falling from 20 to 9. On the 4th and 5th of July they again rose to more than 20, but presently fell below six. Four thousand were supposed to have died, though it was thought that as many recovered as perished. At Jerusalem the contagion discovered itself in January or February, 1760, and about the middle of March reached Damascus. In both places it made great havock; but no accurate accounts were kept of those who died.

N^o VI.*Remarkable case of a Remitting Fever at Bassorah in 1780.*

IN the first part of this treatise we have given an account of the fever which prevailed at Bassorah during the year we speak of, and likewise of the journey of the gentleman from Bassorah to Zebire, where he was taken ill on the 4th of June; but as the first attack went off for that day, we shall only begin the narrative from the day following, as he himself does in these words:

5th June. From this day I date the actual commencement of my fever. About 2 o'clock after dinner I was suddenly attacked with a violent glowing heat all over my body, uneasiness, anxiety and oppression, but in a very inconsiderable degree to what I afterwards experienced; also a swelling in my tongue, which had been coming on some days, and is one of the first symptoms of the fever that prevailed. The fit continued about two hours; a slight perspiration succeeded, which removed the fever, but left a head-ach, thirst, and pains in my back and limbs. In the evening with assistance I got upon the terrace, when the moon and stars appeared of a bright yellow, and all objects had that colour through the whole of my disease; also the pain in making water, and across my loins, became intolerable, like that felt in complaints of the stone in the bladder. I took some tartar emetic, which brought up a great deal of bile, and the next morning a purgative of Rochelle salts, manna, tamarinds and anniseeds.

6th June. In the forenoon a free, copious perspiration, and a perfect intermission of the fever; at night became very restless and uneasy, could not sleep, which I partly imputed to a draught of strong mustard whey, with some antimonial wine, which, instead of causing perspiration, produced the opposite effect.

7th. By the advice of a physician I took some weak decoction of bark, 1 oz. to two pints boiled to one, in the quantity of three tea-cupfuls before dinner. At three in the afternoon I had another hot fit, but not very severe. In the evening grew worse—heat and thirst excessive—drank mustard whey on going to bed, but had a very bad night—no sleep, much oppressed, severe head-ach, and pain over my loins.

8th. Took a gentle purge of cream of tartar and manna, which operated, and gave me some ease. Left off the bark, as it seemed to increase the febrile symptoms, and drank sage and apple tea, decoction of prunes, tamarinds, &c. At 10 o'clock in the forenoon a very severe hot fit; heat intense, oppression in my stomach and breast almost insufferable. Mr. ———, surgeon of the Eagle cruiser, gave me a most nauseous saline mixture, which vomited and purged me severely. The quantity of bile which came off my stomach was incredible, yet I felt no relief, and the agony of the hot fit continued till 4 o'clock in the afternoon, when it went off by a most profuse perspiration. During this fit my thirst was constant and intense. In the evening my skin became dry, the thirst returned, and I had a very bad, sleepless night.

I now began to experience some of the dreadful symptoms which are, I believe, peculiar to fevers in Turkey and Arabia; a sensation of dread and horror, totally unconnected with the fear of death; for, while the patient is most afflicted with this symptom, it is for the most part accompanied with a strong desire to put an end to his existence. The agony from the heat of the body is beyond conception. I have heard some of my fellow sufferers roar hideously under the violence of the pain.

9th Till noon tolerably well. About 1 o'clock the hot fit attacked me, and was full as severe as yesterday; heat and thirst rather greater, and but little relief for more than an hour after the perspiration commenced. This attack left me very weak, much exhausted, with cold, weakening sweats, quick unequal pulse, severe head-ach, confusion, anxiety and incessant thirst; a sleepless night, startings, anxieties, and a constant wish to terminate my sufferings by death.

10th. Forenoon.

10th. Forenoon, pretty free from fever. Attacked at the same hour as yesterday. The fit more violent—delirium. The agony of the heat not to be expressed; the whole body as if on fire; unremitting thirst, profuse perspiration, yet no relief till late in the evening; no sleep, a dreadful night, &c. Pulse about 120, unequal and fluttering.

A mere relation of facts can give but a faint idea of the wretched situation to which the factory was now reduced: by this time eleven twelfths of the inhabitants of Bushrah were taken ill, numbers were daily dying, and the reports from Bagdad and Diarbekir, of the increasing ravages of the plague, left the survivors not a ray of hope that they could escape the calamity. On every countenance pain, sickness and horror were strongly painted; nor were we even left the comforts of sympathy as every mind was too much engrossed with its own sufferings to think of administering consolation to others. Four of us lay under the portico of one of the squares of the factory, calling out for water in a frenzy of thirst. We used to snatch it from each other, and to supplicate for a mouthful with as much fervour as a dying criminal for an hour of further life.

About this period of the fever my eyes became very weak, and every object I saw was quite yellow. This effect was most perceptible at night, in looking at the moon and stars. In the evenings we were sometimes carried in our cots upon the terrace of the factory for air; but the wind was so heated by the burning sands of the desert, that we felt it more intolerable than even the lower apartments. We all remarked that the *Shemmal* or north winds, which blew without intermission at that time, greatly increased our heat and thirst.

The daily very evident increase of my fever, and its effects upon others becoming more fatal and alarming, determined me, while any strength remained, to embrace the consul's offer of flying from the seat of infection to Bushire, in the Ranger cruiser.

11th. After an exceeding bad night I was carried early in the morning on board the Ranger, and was not very ill until about 9 o'clock, when I felt the fever coming on, with new and more alarming symptoms—violent head-ach, giddiness, dimness of sight, approaching delirium, horror, and a most painful oppression and burning heat in my stomach.

In despair, and to try to quench the unsufferable heat in my stomach and bowels, I took a pretty large dose of nitre. The oppression and pain increased; in my confusion I took a paper of tartar emetic, which immediately began to operate. From that time, about ten o'clock, till half past two in the afternoon, I know but little of what passed: I was almost all that time either distracted with pain, or in a swoon; and had it not been for the extraordinary care and attention of the commander of the cruiser, who supported me in his arms, and administered such cordials as I, in the short moments of recollection, could call for, I have not a doubt but I must have sunk under this attack. He counted eight times that I fainted, and sometimes an interval of ten minutes before he could perceive any symptoms of returning life. I was chiefly supported by wine, hartshorn, and spirits of lavender. About three o'clock I had recovered my recollection; most copious and continued sweats had carried off the violence of the fever; but faintings and total privation of strength and spirits remained upon me till late in the evening, when I became to all appearance, for a short time, perfectly well. A little strength returned, every symptom of fever vanished, and my feelings were almost the same as if in perfect health. Some circumstances having prevented the Ranger's carrying me to Bushire, I was taken ashore in the evening. When I was brought to the factory I had an appetite, and ate some chicken broth for supper. Mr. Ross, who had hitherto escaped the fever, administered a potion of laudanum, and, I believe, antimonial wine, on going to rest. I slept pretty well, and awoke refreshed in the morning. I, however, soon became ill, and at noon I had a severe attack, which continued three or four hours, and left me greatly weakened, my skin extremely dry, pulse quick, fluttering and irregular, beating from 100 to 120, with an unquenchable thirst, which no liquids could allay. We had no acids of any kind, which we had great reason to regret.

I did not know till late in the evening that Mr. Abraham, the vice-consul, who for some days past had been ill of the same fever, had determined to embark

bark in the Eagle cruiser next morning for Bushire, as the only chance of saving his life; and a conversation which I overheard to this effect, that as I was so very ill, and no hopes of my recovery, it would be better to leave me to die at Bufforah, made me still more anxious to fly from the place, although I remember well I had not the most distant hope that I could live. I had suffered much at the factory, and in the peevishness of illness I thought (perhaps unjustly) that my living or dying seemed to be a matter of too little consequence to those whom in health I had treated with much kindness and affection.

About ten o'clock, as I was lying in my cot, on a terrace adjoining the stairs from whence the boat was to put off, I was seized with such a fluttering, palpitation, starting, difficulty of utterance from the swelling of my tongue, that I lay in momentary expectation of breathing my last. This was, however, probably the cause of my hearing the preparations for the departure of the boat. About midnight they were leaving the shore. I could not make myself heard, and I was too weak to get up without help. I made several efforts, and at last overpowered the cot I was lying upon and brought myself to the door, from whence I crawled on my hands and knees to the side of the river. Humanity pleaded for me, and I was taken into the boat, in a situation of wretchedness I never can forget. We were, after being several hours on the Euphrates, carried on board the Eagle, opposite to Margil, a country house belonging to the factory, a few miles distant from Bufforah.

12th. The day was uncommonly hot, and my fever came upon me about ten o'clock. The heat was intense. Mr. ——— a young unexperienced Frenchman, gave me tamarind water and cream of tartar, which had not a good effect. I now discerned the first symptom of a cold fit, but it was slight and of short duration. This day, however I supported the fever rather better than usual, and in the evening had a short intermission, and slept a little during the night. The air on the river was this day cooler and more refreshing than on shore.

13th. About eleven o'clock had a regular cold shivering fit, succeeded by a very severe hot fever, which continued till five in the evening, when I was somewhat relieved by perspiration. This day the agony of the hot fit was inexpressible, with great pain in my loins, and a constant inclination to make water, which came from me in drops like blood. I had a very bad, sleepless night.

14th. By Mr. ———'s advice I took a dose of tartar emetic, which not working, he gave me some ipecacuanha. I brought up a great deal of bile, but the fever increasing, my sufferings under it were greatly increased by the operation of the emetic, which worked powerfully both upwards and downwards. This was a trying day indeed. I can give no idea of what I suffered, which must have been intolerable, attended with intervals of delirium and frequently swooning. About five the fever began to abate a little, and at six Mr. ——— gave me a small dose of decoction of bark, which seemed instantly to cause a return of the fever, heat, thirst, anxiety and pain.

My fellow-sufferer, Mr. Abraham, was in violent agony this day; he cried out repeatedly that a fire was consuming his bowels, and that he was in exquisite torture. The captain of the cruiser had been complaining; he, Mr. Abraham and myself lay in the same cabin. About 4 o'clock in the afternoon, when my pain was excessive, I crawled from my cot, with an intention to drop myself from a port-hole which was under the captain's bed, into the river. I had nearly accomplished my purpose, when the captain perceived me, and had me carried into my bed. I was not delirious; and, in spite of all my resolution, the agony I suffered this day made me repeatedly scream out. One of our seamen died suddenly, and the blood, I was told, instantly flowed from all parts of his body.

This evening we arrived at Bushire. On our coming to an anchor Mr. Abraham was immediately carried ashore; but I was too ill to be moved, and accordingly followed in the morning with Capt. Sheriff, after a very severe, sleepless night.

The heat was so excessive this day that even the natives we had on board sunk under it, and many of them were struck down with the sun. By noon nobody could

could keep the deck; and about this time the vessel ran aground on the bar at the mouth of the Euphrates, but fortunately beat over, and got into the gulf. Two more of our people died in the evening; and I should have mentioned that, in sailing down the river, we saw them throwing many dead bodies from the vessels which were at anchor below Buiforah, and many boats crowded with people from the Arabian shore, passing over to Persia.

The Persians at first opposed the landing of our sick, and threatened to burn the ship; but they were prevailed upon by the company's agent at Bushire, a most worthy man, to permit us to come ashore.

15th. I was so weak that it was with difficulty they could carry me ashore in my cot; my strength was quite gone, and I was helpless as an infant. Some grapes, water-melon and ice had been got for Mr. Abraham: of the latter he had eaten freely; I was much pressed to do the same, but was afraid of its increasing my pain, and could hardly be prevailed upon to taste it; I, however, swallowed a little, but by this time my tongue and throat were so swelled that I had difficulty in getting any thing down. About 10 o'clock I was attacked as usual; but I was become so weak, and the fever running higher than usual, that I appeared in the course of this day, more than once, to be in the agonies of death; perspiration gave no relief to the violent pain and oppression I laboured under.

The factory at Bushire is a miserable, wretched mud building, bearing more resemblance to a stable than a human abode: the few rooms, or rather cells, are insufferably hot, even to those in health, and the rest of the building has no cover from the sun. In one of the best of these recesses in the wall Mr. Abraham and I were placed, and on the same bed, as there was not room enough for two: our agonies were great, and our cries dreadful. About 7 o'clock in the evening I perceived my companion in the agonies of death. The company's agent, Mr. Beaumont, most humanely afforded him every assistance in his power; and when every other person was afraid to come near us, he himself attended, and administered such cordials as he thought might give us relief. Mr. Abraham died in great pain; and, for fear of alarming the inhabitants, or rather commandant or sheik of the town, Mr. Beaumont thought it necessary to conceal his death. It was some time before the dead body could be removed, which had become very putrid, and covered with purple spots. I have been since told that immediately after death a great quantity of blood or bile flowed from him as black as ink, and so highly offensive as to be smelt at some distance from the factory. Past midnight we were both removed to the terrace, but, unfortunately for me, there was only one spot where we could lie, and the smell of the dead body became intolerable; I was, however, cleaned and put into another bed by the humane assistance of Mr. Beaumont, who sat by me, and treated me with uncommon tenderness. I recovered a little, but passed a dreadful night indeed. I shuddered at the agony which I was to feel on the return of the sun, and most anxiously wished for death, as the only relief from pain that I could expect. I was unable at this time to move hand or foot, and at times could not speak. I told Mr. Beaumont that I thought a gentle dose of physic, if it could be got down, might alleviate the racking pain in my breast, stomach, bowels and loins; he accordingly prepared some salts, manna and tamarinds, and gave it to me in the morning.

16th. At eleven o'clock the violence of the fever came on; I grew delirious, swooned, and the symptoms of approaching death, I was afterwards told, grew evident to those around me. My eyes were fixed, my tongue hung from my mouth, and my face grew quite black. I recovered from this fit about twelve o'clock, and felt excruciating pain, and a burning, suffocating heat. My stomach and bowels seemed all on fire, my lungs played with the utmost difficulty, and I felt a pain and sensation about my heart which I cannot describe. I was unable to move; my servant lifted me; I fell into a swoon for a few minutes, and, when I came to myself, a great quantity of black putrid bile flowed from me. Relief was instantaneous, and I slept or swooned till about 5 o'clock, when I found myself free from fever, and able to speak, my recollection clear, and my mind perfectly composed, but my body so weak that I had no power of moving, except one of my hands. They gave me
some

some sustenance; I had a little sleep; but about midnight I fell into a situation which I had all the reason to think indicated the immediate approach of death. My tongue cleft to my mouth, my extremities were as cold as ice, and the coldness also appeared to extend up my thigh; my arm was destitute of pulse, nor was the smallest pulsation of the heart perceptible; I never had my recollection clearer, or perhaps so clear, in my life. My servant was lying by my bedside; I was convulsed for some minutes; and, on recovering, I got out the word *boy*. Fortunately for me he was not asleep, and heard me; I then got out the word *wine*; on which he brought me a glass of claret, which, with much difficulty, I got down; I felt myself much revived; I reflected on my situation; and, although I had not the most remote idea of surviving that night, I recollected that I had some fine powdered bark in my trunk, and it occurred to me that, if any thing could be done to preserve my life, it would be that medicine taken in red wine; but, my speech immediately failing me, I could not direct the servant to give it to me. Death seemed approaching; coldness had seized all my limbs; my sight became confused, as I perceived from looking at the stars, which danced before me; and the rattle or noise in my throat was very perceptible to the servant, as he afterwards told me. I fainted and continued in a state of insensibility, I believe, for about an hour. The loud lamentations of the servant, bewailing his own misfortune in losing his master in a country so remote from his own, seemed to recal me to life; I felt as if refreshed with a little sleep, and got out the words *bark and wine*; it was instantly brought, and the man gave me two large tea-spoonfuls in a large glass of claret. The effect was instantaneous, and operated like a charm; the coldness left me, I could speak intelligibly, and could move my hands. I told the servant to give me a tea-spoonful of the bark every hour, in a glass of claret. By 8 in the morning I had taken six doses, and more than half a bottle of claret. I was considerably strengthened, and could converse with Mr. Beaumont, who encouraged me to persevere in the bark, and treated me with uncommon attention. I had been sadly neglected at Bufforah, but this was amply made up to me by the humane and tender attentions of Mr. Beaumont, who was a great predestinarian, and who never shunned danger when he felt it a duty to assist a fellow creature. He waited upon me like a nurse, consoled me under pain and sickness, and, when my fever was at its greatest height, he has often held me in his arms, when I wanted to be removed, or my bed shifted. About this time my legs and thighs became covered with blotches of a dusky brown hue, some of them as broad as the palm of the hand, quite dry, and they itched intolerably. At the same time several little boils broke out in different parts of my body, but there was only one, over my eye, that came to suppuration; the others, and the eruption on my legs and thighs, all disappeared.

I continued the bark till 12 o'clock, and then left it off till 4, when I took another dose. The dreadful fever of the preceding days did not return on this, but I was still extremely ill, had very great difficulty in speaking and breathing; a swelling also in my throat, parched tongue, and unquenchable thirst. I had not the most distant hope of living. I tried to take some broth, but the swelling in my throat prevented my swallowing. I passed a very bad night, with startings, anxiety, and great pain over the kidneys; and what little sleep I got seemed to make me worse; I was fatigued with it, and under the constant dread of suffocation: towards morning my throat grew worse, and my thirst was excessive.

18th. Left off the bark, uncertain what I ought to do—no fever, but the same symptoms as the day before—drank a little chicken broth, which was the only sustenance I had taken for four days before—great oppression and heat in my stomach and bowels. Mr. Beaumont found out an Armenian who professed physic. This man gave me a clyster, which gave me great relief, and a water to drink, famous as a febrifuge among the Persians; I drank of it freely, and found much benefit from it. But the most extraordinary of all the symptoms I experienced was this, that, the third day after the first intermission of my fever, one of my teeth, and one of the nails of my hand, came out without the smallest pain, only a little swelling in the gum; and, on the nail falling off some matter flowed from the end of my finger. I never had the tooth-ach. At this time the boil on my eye suppurated. From

From the 18th of June to the 5th of July, being seventeen days, my fever did not return. I recovered strength slowly, and could walk a little, supported by two men. My food was chiefly chicken and veal broth, and about a glass and a half of Madeira wine a day. Yet I had many symptoms of disease hanging about me—restless, fatiguing nights—great thirst—bad taste in my mouth: every thing I took seemed bitter and salt—pains in my back, sides and loins, and great difficulty in making water. In this time I passed much bile, naturally and by clyster; and I had a purgative from the Armenian, which weakened me greatly.

The springs lifted, as seamen term it, three days before the change. The opinion is universal in those countries, and also in India, particularly Bombay, where intermittents are prevalent, that the change and full of the moon has an effect upon all intermitting diseases, of which afterwards I had many proofs in my own case. To prevent a relapse, I took some decoction of bark, but in too small quantities to answer the purpose.

4th July. My water, from being thick and muddy, became quite clear.

The 5th of July, after dinner, I was taken with a slight hot fit, which continued about two hours, and then went off by copious perspiration; the remaining part of the evening I was entirely free from fever.

6th. I took decoction of bark—no fever.

7th. At 11 o'clock a regular cold and hot fit; the former continued three quarters of an hour, the latter two hours. Although much less severe than my former fever, yet I suffered a good deal from the hot fit. Left off the bark by the advice of the Armenian, who told me that it heated me and made me worse. Much weakened by this day's illness; nor did the perspiration entirely free me from the fever.

8th. Had a clyster thrown up, and early in the morning took a draught from the Armenian, composed of fine vinegar, sugar, and a country seed infused over night in water.—A slight hot fit, but of short continuance.

9th. The draught of yesterday repeated—at 10 a regular cold and hot fit, rather less violent than the last.

10th. No fever—tolerably well.

11th. Between 8 and 9 in the morning a cold and hot fit, much more severe than the last—great heat, thirst and oppression—much weakened. I now perceived I had got a regular tertian, and determined on the bark, but was prevailed on by the Armenian not to use it, he promising to cure me in a day or two. He gave me water-melon and his infusion of vinegar and seeds.

12th. No fever—find the water-melon to disagree greatly with my stomach.

13th. Had not as yet indulged much hopes of recovery. I felt still, even in those days previous to this last relapse, many alarming symptoms of disease, which made me apprehend I could not recover; and this last attack had again reduced me so low, that it was evident that, unless I could get removed from those scorching climates, a very short time would put an end to my life. Except in the humanity and goodness of Mr. Beaumont, I was without a single comfort or conveniency of life at Bushire. The heat of the weather seemed daily to increase, and the house we were in hardly covered us from the direct rays of the sun. My servant was taken ill, and appeared to be dying: it was with the greatest pleasure, therefore, I received the accounts this day of the Eagle cruiser having arrived last night from Bussorah, on her way to Bombay.

At half past seven o'clock I had a very severe fit; the hot fit was uncommonly violent, and continued about three hours. I was much reduced, and resolved at all events to take the bark in powder, and in large doses, and to dismiss the Armenian. In this I was confirmed by Mr. Puget, who informed me that the few survivors at Bussorah owed their lives entirely to the bark, which had at last been given in very large doses.

14th. I took four doses, or eight tea-spoonfuls, of powdered bark. It purged me, and carried off a great quantity of black putrid bile. This evening I was carried in my cot on board the Eagle, resolved at all events, even if I had been certain of dying in the boat, to leave Bushire, where I had hardly shelter from the sun, and where the heat was so excessive, that Capt. Alderson

of

of the Eagle and two passengers were taken ill from it last night. I got on board very late, yet found myself refreshed from the sea air.

15th. The fever did not return. I continued to take the bark as yesterday, and found myself surprisingly strengthened. I persevered under this course till the 3d of August, when the vessel arrived at Muscat, and I was astonishingly recovered for the shortness of the time.

From the 14th of July to the 3d of August I had taken seven ounces of bark; and as the fever had returned upon me the last day of the springs at the preceding change of the moon, two days before this change I increased my daily dose, and continued in this manner till the 4th, when the springs being over, and perceiving no symptoms of fever remaining, I left off the bark entirely. I had generally taken six tea-spoonfuls every day.

From the 15th of July till my arrival at Muscat, a seaport on the coast of Arabia, my recovery was exceedingly rapid. I had a keen appetite, a pretty good digestion, sound, refreshing sleep, and my daily increase of strength was very perceptible. My diet, till this time, had been generally chicken broth, rice and boiled fowl, light pudding, &c. On leaving off the bark I observed no particular regimen, only abstaining from salted and high-seasoned meats, and confining myself to three or four glasses of Madeira. I found that an infusion of prunes, with a small quantity of cream of tartar, was of much service to me during the course of the bark, as it kept me cool, and my body open. I was sensible, at times, during my recovery, of a slight but troublesome pain under my fifth rib on the right side, especially when I lay on that side; but from feeling and pressing my hand over the region of the liver, and from other circumstances, I had no reason to suspect that my liver was affected; and, as it soon left me, the cause was probably trifling or accidental.

On my leaving Muscat a large boil came upon the hip-bone, the size of a small melon, extending some way up the side, and down the thigh, with a hard basis. After arriving at Bombay, which we did in fourteen days, it broke, and in a few days healed up. I shall only add, that at Bombay I was detained four months before I had an opportunity of proceeding to Europe. In that time I had three returns of my ague, but on taking a few doses of bark it left me. Those attacks happened at the change of the moon. From Bombay to Europe I had three or four slight fits of the ague; the worst on our making the coast of South Guinea, at the settlement of Benguela, where we found the wretched remains of a Portuguese garrison, the survivors of a fatal putrid fever, which, as they told us, raged in those parts for eighteen months before. The last attack I had was the day we made the Rock of Lisbon, since which time I have had no returns of the ague, although, when the wind continues long at east, I am sensible of a tendency to that complaint.

I shall now give a brief account of the fate of my fellow sufferers at Bussorah. This unfortunate party consisted of capt. Sheriff, of the Eagle cruiser; Mr. Brown, a Bengal merchant, carrying goods from India to Aleppo; Mr. Palmer, a gentleman returning with his fortune from Bengal to Europe; Mr. Robson, surgeon to the factory; Mr. Abraham, the vice-consul; Dr. Ross, who had practised many years at Constantinople, some time in Bengal, and was then taking the opportunity of accompanying me across the desert; Mr. Smith, a merchant from India; and an Italian Carmelite, the vicar of Bussorah, who came from Bombay. It is unnecessary to say that the *febrilis* is a common symptom in the Turkish fever, or, in other words, a strong desire of self-destruction. We had a fatal instance of it in our party. Mr. Brown, the second day of his fever, being left alone, got to his pistols, and, throwing in four or five balls, discharged them into his breast, and was found dead a few minutes afterwards. I believe every one of us at times would have done the same, had we been possessed of the means of accomplishing it. Mr. Robson died the third day of his fever, in great agonies, but perfectly sensible. His was a continued high fever, without any remission. Mr. Palmer died the 4th day, under the same symptoms as the preceding. The Carmelite, the second morning after he was taken ill, had opened a vein in his arm, and bled to death, most probably intentionally. Captain Sheriff was seized with the fever on his return from Bussorah to Bussore. He died the third day, in a manner which is even painful to relate. He was a man of singular

singular strength of constitution, and suffered unusual agonies before he died. His cries were heard all over the factory; he foamed at the mouth, gnashed with his teeth, and tore his arms with his teeth. Those who heard him compared his cries to the bellowing of a mad bull. He was no sooner dead but his body was covered with purple spots, and so offensive that the people could hardly carry it out to be buried. Mr. Sheriff's was what they call the worst kind of plague.

Mr. ———, formerly mentioned as having escaped the plague at Busforah by shutting himself up in a mud house, was seized on his voyage to Busforah with a kind of insanity, imagining that people were conspiring against his life, and that he was capable of overhearing, at a great distance, even a whisper spoken to his disadvantage. He, however, escaped the infection, and returned to England in health.

N^o VII.

Set of Queries furnished by Doctors AIKIN and JEBB; and by Mr. HOWARD put to several foreign Physicians, during his tour; with their Opinions concerning the Plague.

1. **I**S the infection of the plague frequently received by the French?

Answer, by *Raymond*, physician at Marseilles: Sometimes it is. — *Demollins*, surgeon do: In the lazaretto some have touched infected bodies and things with impunity. Attributed to the temperament of the body. — *Giovannelli*, physician to the Leghorn lazaretto: The plague cannot be communicated but by very near approach, or touch: air cannot be the vehicle. — *They*, physician to the Malta lazaretto: It may happen that one person may inhabit the same chamber, or even touch an infected person, with impunity; of which I have known instances; but all who approach the atmosphere of an infected body may receive the infection by respiration. Contagion is almost always received before touching or approaching the infected person. — *Morandi*, physician at Venice: Contact is one of the most powerful and dangerous means of communicating the infection; but for the development of its effects a predisposition in the receiving body is necessary. — *Verdoni*, physician at Trieste: It is most frequently communicated by the touch. It has been given by a flower held and smelt at, first by two persons who remained free; and then by a third, who sickened and died in 24 hours. — *Jew* physician at Smyrna: The infection is in reality communicated by the touch alone; for all who keep from contact of infected persons or things remain free. To the effect of contact, however, a certain disposition of the air is necessary; for we often see infected persons arrive from other countries, yet the disease does not spread. But what this disposition is can scarcely be conceived. Commonly in this climate, the disease appears at the end of spring, and continues to the middle of summer; with this particularity, that, in cloudy weather, and during the *sirocco* winds, the attacks are more frequent. Also in the same diathesis of the air some receive the infection, while others exposed to the same dangers escape it. From observation it appears, that cachectic persons, and those of constitutions abounding in acid, do not readily take it. The contagious miasmata may be dormant in the body for some time without doing the least harm, till set in motion by sudden fear, or the excessive heat of a bath. — *Fra. Luigi di Pavia*, prior of the hospital of San Antonio at Smyrna: The plague is communicated by contact, according to all the observations I have been able to make for eighteen years.

2. Does the plague ever rise spontaneously?

Raymond: Incontestible experience shows that it only proceeds from contact. — *Demollins*: From all ages the plague has been brought to Marseilles.

scilles by merchandise or persons beyond sea.---*Giovanelli*: As the disease always appears with the same symptoms, it is not probably spontaneous, but the consequence of a particular contagion.---*They*: Some contagious fevers come of themselves; others proceed from the communication of contagion. The plague is thought to have originated in Egypt, and spread itself from thence.---*Morandi*: Contagious fevers do not arise of themselves, but are always the product of a peculiar poison.---*Verdoni*: I know no fever that can properly be called contagious, and doubt if even the plague can be considered as such. My reasons are drawn from the very different manner in which the plague appears in different years, and the different degree in which it spreads. I therefore conclude that contagious fevers come of themselves.---*Jew physician*: According to the most ancient authorities, the plague has always been brought to Smyrna by contagion, and was never produced here.---*Fra. Luigi*: Ancient and common observation in this city prove that the plague is derived *solely* from contagion.

3. To what distance is the air infected? How far does actual contact, wearing infected clothes, or touching other things, produce the disease?

Raymond: The infected are safely conversed with across a barrier, which separates them only a few paces.---*Demellins*: The air round the patient is infected more or less according to the degree of poison which exhales. Here in the lazaretto they are spoken with across two barriers, a few paces from each other, without fear of contagion. Hence it would appear that the plague is communicated only by the touch, or still more by wearing infected clothes.---*Giovanelli*: If one speaks of an infected person shut up in an unventilated chamber, it may be said that the whole chamber is dangerous; but if one speaks of a patient exposed to the open air, it has been proved that the infection does not extend beyond five geometrical paces from the body. Beyond this distance one is in safety. The actual touch of an infected person or thing is proved to be very dangerous by fatal experience; but to what degree, is not ascertained.---*They*: The infection extends only some paces; and the miasms, at the distance of about ten paces, are so corrected by the air as to lose all their activity. It may be communicated by touching infected things, especially of a porous nature, as cloth, wool, skins, &c.---*Verdoni*: From the moment of infection to the time when nature has entirely dissipated the contagious principle, which usually happens in forty days, there is always a capacity of communicating the infection. The degree of infection is in proportion to the volume of air surrounding the patient; the air being what absorbs, dissipates and communicates the contagious principle. Infected substances communicate the disease for many years, in proportion to the ventilation they have undergone, or of which they are susceptible.---*Jew physician*: The degree of infection in the air about the sick depends upon the greater or less malignity of the disease, and other circumstances. The air about poor patients is more infectious than about the rich. These things being established, I am of opinion that, in the greatest contagion, we may securely see a patient at the distance of two ells, if the chamber windows be not all shut.---*Fra. Luigi*: The infection is greater or less in proportion to the virulence of the contagion; but I have made no observation as to the distance. The disease is communicated by contact of all infected things, and by close inspiration of the breath of the sick.

4. What are the seasons in which the plague chiefly appears; and what is the interval between the infection and the disease?

Raymond: The plague shows itself at all seasons, but less at the two solstices.---*Demellins*: Great ravages may be made in all seasons, but principally in the greatest heats of summer. From the infection to the disease is two or three days.---*Giovanelli*: The plague appears at all times, in the same manner as poisons at all times produce their effects. But observations show that its ravages are greater in hot seasons than in cold; and it seems that summer and the first months of autumn are most to be dreaded. There is no certainty as to the interval between the infection and the disease, as it depends on the particular constitution of the patient.---*They*: Warm, moist seasons contribute to the production of all infectious diseases. The interval from the infection to the seizure is various, according to the virulence of the poison, and

and the constitution of the patient. Sometimes it acts slowly, sometimes like a stroke of lightning.—*Verdoni*: The spring is the principal season. Generally the disease shows itself at the instant of touch, like an electrical shock. Sometimes a person retains the contagious principle without any sensible effect, and then unknowingly communicates it to a third, in whom, if predisposed to the disease, it becomes active; or, otherwise, it may be communicated to others successively in the same way, till it becomes dissipated and annihilated, as happened at Smyrna in 1783. In bodies predisposed it very rarely conceals itself till the third day.—*Jew physician*: Answered in the first.—*Fra. Luigi*: The plague is most fatal in Smyrna from April to July; and it is constantly observed that great colds and heats much diminish it, and copious dews extinguish it. The infection shows itself in 24 hours, more or less, according to the difference of temperament.

5. What are the first symptoms of plague? Are they not frequently a swelling in the glands of the groin and armpit?

Raymond: The plague often conceals itself under the form of an inflammatory, ardent or malignant fever. Tumours of the glands are often its first symptom.—*Demollins*: The first symptoms of the plague vary; but the most common are, buboes in the armpit and groin; parotids and carbuncles in various parts of the body.—*Giovanelli*: The first symptoms are, debility, fever, excessive thirst, followed by great heat; after which carbuncles or buboes appear in the armpits, groin and parotids. The groin is sooner attacked than the armpit.—*They*: Swellings in the armpits and groin are indeed the characteristics of the plague; yet they are not the sole nor the first symptoms, and often are not seen at all; as when the plague disguises itself under the form of other diseases.—*Morandi*: Glandular swellings are properly the symptom of the second stage, and are preceded by those febrile symptoms which are immediately the consequence of receiving the infection; such as pain in the head, drowsiness, great prostration of strength, dryness of the tongue, vomiting, hiccough, tremor, diarrhoea.—*Verdoni*: Its first symptoms are relative to the constitution of the year, and of the body seized, and the place where it was produced, or whence it came. In 1783 all the parts of Natolia were infected; and the disease transported to Smyrna, which is the centre, was extinguished without the loss of a single person. Generally the plague of Constantinople, transported to Smyrna, does little harm. That of Egypt causes havoc, as in every country. That of the Thebais is always cruel, and, carried to Lower Egypt, is fatal. The inguinal glands are most generally affected.—*Jew physician*: The swelling of the glands is seldom the first symptom. Patients are every day seen who, being supposed ill of another disorder, in two, three or more days show glandular swellings, or carbuncles, by which the plague is manifested. On the contrary, many, who from the usual signs are supposed to have the plague, become well in a day or two, without any external swelling. The first symptoms are, horripilation, or actual shivering, nausea or vomiting, loss of strength, and fever. These are common to many diseases; but the pathognomic signs are, a difference in the pulsations of the two sides, with this circumstance, that from the diversity a prognostic arises; it having been observed that if the pulse on the side of the tumour or carbuncle be greater or more frequent, it bodes well; whereas, if it be smaller, it shows greater malignity, and more is to be feared. Further, there is observed among the first symptoms a visible pulsation in the carotids, greatest on the affected side; and also a crystalline vivacity in the eyes, with a kind of contraction or diminution of the eye on the affected side.—*Fra. Luigi*: The most remarkable symptoms of the plague are, turbidness and sparkling of the eyes, the tongue furred with a white mucus, and very red at its tip, frequent biting of the lips, violent pain in the head, and inability to hold it up; a sense of great cold in the loins, vomiting, debility. Swellings of the glands are not among the first symptoms.

6. Is it true that there are two distinct fevers with nearly the same symptoms, one of which is properly termed the plague, and is communicated from a distance by the air, and without contact; while the other, which is properly termed contagion, is only communicated by the touch, or at least by near approach to infected persons or things?

Morandi:

Morandi : It is certain, from multiplied observations, that there are two sorts of pestilential fevers, similar in appearance; one of which proceeds from the contamination of the air alone, and is communicable to any distance; the other is produced alone by contact, or near approach. The former of these is properly termed a pestilential fever, the latter a contagious one.—*Verdoni* : The distinction of these fevers is useless; since the same which is communicated by the touch, is that also conveyed by the air to a certain distance, especially in a close place.—*Jew physician* : That there are two kinds of plague is absolutely to be denied; yet sometimes it happens that persons are attacked with the plague without knowing from whence it came.—*Frx. Luigi* : I hold it for certain that there is only one species of plague, though differing in malignity.

7. What is the method of treatment in the first stage; what in the more advanced periods? What is known concerning bark, snakeroot, opium, wine, pure air, the application of cold water?

Raymond : The disease is treated as inflammatory. No specific has been discovered for it.—*Demellins* : At the beginning, bleeding, vomiting, purgatives, diluents, refrigerants and antiseptics are used; afterwards antiseptics and cordials, relatively to the temperament and symptoms.—*Giovannelli* : The plague causing always a disposition to inflammation and putrefaction, it is always proper to bleed proportionally to the strength, and to use a cooling regimen, with the vegetable acids. The repeated use of emetics is also proper, both to clean the first passages, and to dispose the virus to pass off by the skin. In the progress it is necessary to favour the evacuation of the virus by that issue which nature seems to point at. Thus either antiphlogistic purgatives are given, if nature points that way, or suppurative plasters are to be applied to any tumours which may appear. Epispastics to the extremities are proper where nature wants rousing. The vitriolic acid in large doses has been found very serviceable in the plague at Moscow, attended with carbuncles. When the inflammation is over, and marks of suppuration appear, the bark, with wine and other cordials, is proper. The surgeon's assistance is proper in the treatment of boils and anthraxes, which last are seldom cured without the actual cautery.—*They* : In the beginning of pestilential fevers bleeding is sometimes proper, and vomits almost always. In their progress frequent subacid and cold drinks, the bark given liberally, and vitriolic acid, have been found powerful remedies when there was a dissolution of the blood.—*Morandi* : In the first period, evacuations, according to the particular circumstances of the case, are proper: in the second, bark mixed with wine, and opium as a temporary sedative. Pure air is very necessary; and fire as a corrective, with the burning of antiseptic and aromatic substances.—*Verdoni* : As soon as a Christian finds he has got the plague, he eats caviare, garlic and pork; drinks brandy, vinegar and the like, to raise the buboes. Upon these he applies greasy wool, caviare, honey of roses, dried figs, &c. to bring them to suppuration. The Turks and Arabs drink bezoar in powder with milk, and other sudorifics, in order to expel the virus. They vomit, and possibly a second time. At Cairo they take opium, and cover themselves with mattresses in order to excite sweat; and, though parched with heat and thirst, they drink nothing. They open the immature buboes with a red hot iron. At Constantinople and Smyrna they eat nothing, and drink much water and lemonade. The Jews drink a decoction of citron seeds, lemon or Seville orange peel, and their own urine. They abstain scrupulously from animal food. In 1700 a physician in Smyrna found bleeding very useful. Another, in another year, cured the plague by bleeding, and an antiphlogistic regimen. My brother in Cairo treated it like a biliary fever, with vomits, saponaceous attenuants, and antiphlogistics; and successfully. Some sailors at Constantinople in the frenzy of the plague have thrown themselves into the sea; and it is said that on being taken out of it they have recovered. My opinion upon the whole is, that the treatment ought to be relative to the constitution of the year, and of the patient, by which the nature of the disease itself is greatly altered.—*Jew physician* : Bleeding in many cases may be serviceable, as I have known patients, who were bled by mistake, recover; and others recovered from a most desperate condition by a spontaneous hemorrhage. On the other hand, persons

persons have been apparently injured by both these circumstances. The difference of effect seems to depend on the state of the blood, whether it be disposed to coagulation or dissolution. In the former, bleeding is useful, in the latter, hurtful. Vomits, according to my experience, have not succeeded; yet I should not hesitate to try ipecacuanha in substance, exhibiting half a scruple at two or three times, in the expectation that in this manner it would not run down. Bark may be useful in dissolutions of the blood; and also small doses of opium, and other medicines prudently administered. In excessive watchfulness I have known relief procured by anointing the temples with ung. populeon. In a case of hiccough the liquor anod. miner. Hoffmanni succeeded with one. The Turks, in the violence of the fever, take handfuls of snow, and apply it all over their bodies, and also eat it; and sometimes throw cold water on their feet. But whether this is of service or not cannot be determined; as these people in other respects pay no regard to rules of diet.—*Fra. Luigi*: They who practise empirically in the plague use none of the recited methods, but only strong sudorifics, and ventilation of the air; and complete the cure by proper treatment of the sores by suppuration.

8. When the plague prevails, do the physicians prescribe to those who have the disorder a more generous, or a more abstemious diet? and do they prescribe any thing to the uninfected?

Jew physician: In times of the plague, many are accustomed to eat no flesh; others, no fish; but I know not whether by the advice of physicians. For myself, I have been in many plague years, but have made no alteration in the management of myself.—*Fra. Luigi*: In Smyrna the plague is generally treated with a rigorous diet. They only use rice and vermicelli boiled in water; and sometimes, when the patient is too collicive, juices and herbs boiled without seasoning. From time to time they give some acid preserves, and raisins; and, in great heats, some slender lemonade; and a dish of good coffee with a biscuit every day. For drink they only use toast and water; and they follow this abstemious regimen till the fortieth day of the disease is completed, after which they take chicken broth, lamb, and other food of easy digestion.

9. Are convalescents subject to repeated attacks from the same infection?

Raymond: Not unless they touch something infected.—*Demollins*: Convalescents are sent to fumigated chambers, and there is no instance of relapse.—*Giovanelli*: No instance of relapse, after being well recovered from the first attack, have come to my knowledge; but they are liable to fall into other disorders, such as consumption, hæmoptoe, &c.—*They*: Convalescents are without doubt liable to a relapse, and authors are full of instances of it. In the plague of Messina M. Cotogno says that a man had successively fourteen buboes, and was cured at last.—*Morandi*: All convalescents may relapse.—*Verdoni*: They have it not twice in the same year.—*Jew physician*: Convalescents are often attacked anew, and die; but this does not usually happen from a fresh infection taken elsewhere, but from some remains of their own contagion, excited by intemperance in food, or the venereal act.—*Fra. Luigi*: From irregularities in eating and drinking, bodily fatigues, affections of the mind, especially anger, they are liable to repeated and very dangerous relapses.

10. What is the proportion of deaths, and the usual length of the disease?

Raymond: The mortality is different in different seasons and years.—*Demollins*: In the plague of Marseilles in 1720; half the inhabitants perished. The usual length of the disease is that of other acute disorders; but longer when the tumours come to suppurate.—*Giovanelli*: The proportion of deaths is variable and uncertain. As to duration, when the disease is very acute and fatal, the patient generally dies within five days from the first invasion of the fever, or first marks of the plague. When he recovers, no certain termination can be assigned. If the time of healing all the sores be reckoned, it may be to three, four or five months, or more.—*They*: The mortality is very various. Of ten whom I treated in the lazaretto, three died. I have observed that the fever generally runs on to twenty or twenty-one days.—*Morandi*: The bills of mortality in places visited by the plague usually amount to thirty per cent, sometimes to fifty. (He seems to mean of the whole number of inhabitants.)—*Verdoni*: The proportion of deaths varies

varies infinitely. It has been observed that the Jews in Constantinople and Smyrna lose only one third; which is attributed to the care they take of their sick. At Cairo, on the other hand, they are the first attacked, and lose more than three fourths. The Turks lose two thirds; other nations a little more or less. Europeans in Cairo lose five sixths. Sometimes it kills immediately; sometimes in twenty-four hours; commonly in three days. When the patient gets over the ninth day there are great hopes of recovery, as the buboes are then suppurated. They may, however, die within the fortieth day, especially if they commit any irregularity, the principal of which is eating flesh, which instantly causes a return of fever, and death. It never passes beyond the fortieth day.—*Jew physician*: The mortality is various, as also the duration: some in two, three or four days; some hold out six, eight, or more.—*Fra. Luigi*: Generally more die than survive; but in our hospital of San Antonio of Smyrna, from the care taken of the sick, the number recovering has, for eighteen years past, exceeded that of the dead.

II. What are the means to prevent the plague, to stop its contagion, and to purify infected places?

Raymond: There is no other method of preserving one's self from the plague, than avoiding the contact of infected things. Goods are purified by exposing them to the open air for forty days; and furniture by a strong fumigation with aromatics and sulphur.—*Demollins*: Here, in the lazaretto, infected goods and furniture are exposed to a current of air for forty days. The air of infected places is purified by burning all sorts of aromatics.—*Giovanelli*: The method of prevention is, to avoid all communication with infected persons or goods. The means of stopping the contagion form a body of police, too extensive to be here mentioned.—*They*: The means of prevention, besides avoiding infected things and persons, are sobriety in living, the use of vinegar internally and externally, and an issue. Infected places are purified by fumigation and ventilation, by scraping the lime from the walls, (which is then thrown into the sea) and whitewashing them anew with lime and sea-water, by washing the floors, windows, doors, &c. first with sea-water, and then with vinegar, taking great care to leave nothing that is infected. The bodies of the dead are buried in a place set apart for that purpose; and their beds and bedding are burned. As to other things not used during the illness, the linen is washed with soap and ley; the woollen clothes are put into sea-water for two days, and then ventilated for twenty days. Those which would be spoiled by water are hung on a line in the air for 40 days, and fumigated from time to time according to their quality.—*Morandi*: A fire is to be kept constantly in the sick chamber in all seasons. All feces, &c. are to be immediately removed. Clean sheets and shirts daily. The healthy must avoid commerce with the infected; must purge gently now and then, smoke tobacco, drink pure wine medicated with wormwood, gentian, zedoary, &c. and avoid fear and other passions, and excess of all kinds.—*Jew physician*: No means of prevention are used in the Turkish dominions.—*Fra. Luigi*: Fire, water and air are used for stopping the contagion, and purifying places.—*Verdoni*: The best preservatives are supposed to be sprinkling the room with vinegar and perfumes, ventilation and fumigation. The Greeks in Smyrna during lent, when they eat only vegetables, are seldom attacked; while among those who eat flesh the contagion makes great havoc. Hence the best means of prevention are to eat moderately, and not at all of animal food; to drink water and vinegar; to sprinkle the chamber with the latter; and use frequent ventilation; to change the clothes, especially the linen, daily; hanging in the air such as has been used, for 15 or 20 days. For suppressing the infection every thing is to be washed that can undergo the operation, and the walls of the chamber to be whitened with lime, but after the 24th of June no further care is taken.

ERRATA.

PAGE. LINE.

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| 20. | 23. | For 'destroying three or four thousand,' read 'destroying sixteen hundred out of three or four thousand.' |
| 39. | 13. | from bottom, for 'Zabira,' read 'Zebire.' |
| 86. | 10. | for 'obscured,' read 'obscure.' |
| 153. | 20. | for 'acid other,' read 'acid in the other.' |
| 202. | 15. | from bottom, after 'the inhabitants,' add, 'Farther east it does not go.' |
| 286. | 7. | from bottom, for 'flattering,' read 'fluttering.' |
| 303. | 8. | from bottom (in a few copies) for 'gout, fever,' read 'gaol-fever.' |
| 309. | 10. | for 'safely to,' read 'safely of.' |
| 450. | 2. | from bottom, for 'fluid,' read 'fluids.' |
| 480. | 12. | from bottom, for 'Black affizes,' read 'Black Hole.' |
| 486. | 5. | for 'Hansforth,' read 'Hansford;' also in pages 489 & 510. |
| 502. | 1. | for 'paicity,' read 'paucity.' |
| 513. | 1. | bottom, for 'vol. x,' read 'vol. iii.' |



